

Journal

OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

AVMA Convention—San Antonio, Oct. 15-18, 1956

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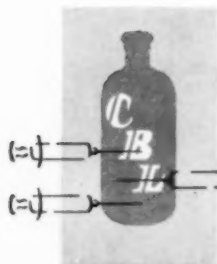
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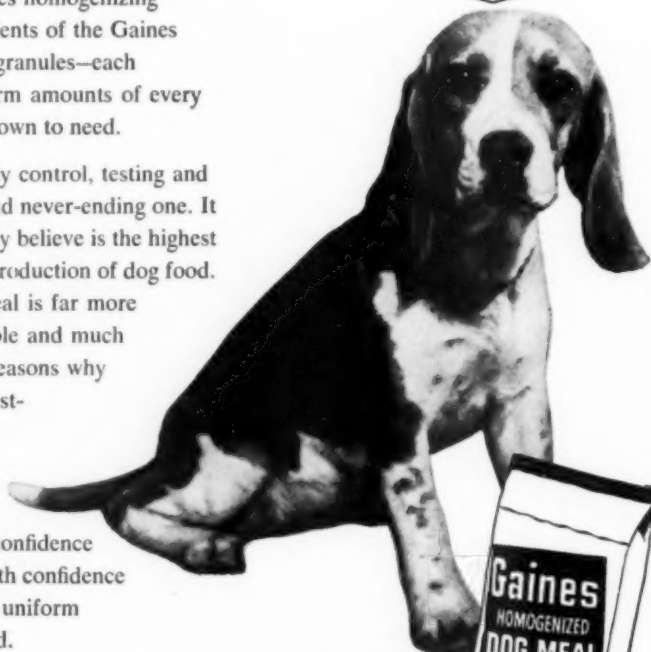
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News From Washington



Legislative action for **continuation** of the **brucellosis eradication** program (see March 15, 1956, JOURNAL, adv. p. 12) was delayed when the Senate became snarled in debate on March 15 concerning the recommendation of the Senate conferees (House-Senate Committee) that the Senate recede from its position amending H.R. 8320 to provide \$20 million annually for 1957-1958 (**Congressional Record**, March 15, 1956: 4319-4324).

A motion by Senator Bourke B. Hickenlooper (R., Iowa) to recommit the conference report, and requesting further conference with the House members, with instructions to insist on the Senate amendments, was lost by a vote of 46 to 48. The Senate then approved the conference report authorizing \$2 million additional for the year ending June 30, 1956. The "snafu" in the Senate boiled down to a question of procedure rather than opposition to continuing the accelerated program beyond 1956, i.e., to vote for the additional funds for the current fiscal year, then throw the future existence of the program into the highly political farm bill, or whether to now vote on a two-year extension. Senators Hickenlooper and George D. Aiken (R., Vermont) led the fight to extend the program through 1957-1958. On March 21, the House, acting as a committee of the Whole House, rejected the conferees report (House and Senate), then voted to approve H.R. 8320 as originally amended by the Senate. Therefore, the bill now goes to the President for signature and provides \$2 million additional for the year ending June 30, 1956, and \$20 million annually for 1957 and 1958.

★ ★ ★ ★

An Interagency Committee, appointed by the Civil Service Commission and composed of representatives from interested departments and agencies, has submitted its report on **premium pay** for certain **federal inspection personnel**. The report is based on a study the President directed be made of premium pay, government-wide, to inspection personnel, primarily because certain inspectors are not eligible to receive overtime pay. Also, inspectors authorized overtime pay, regardless of grade, can not be paid more than the minimum in first step, grade 9. The Civil Service Commission has not completed its review of the committee study; therefore, has not officially released the report. This subject is of definite interest to at least three veterinary inspector groups in ARS. Dr. C.H. Pals, Meat Inspection Branch, ARS, represented the ARS on the Committee.

★ ★ ★ ★

Senate Bill 3430, introduced by Senator Lister Hill (D., Ala.) with Senator John F. Kennedy (D., Mass.), would take the **Armed Forces Medical Library from Department of Defense** and establish it as a **National Library of Medicine**, governed by a 17-member Board of Regents, its members composed of the Surgeons General of Army, Navy, Air, and the Public Health Service, Librarian of Congress, and 12 citizens appointed by the President from medical sciences and laity. For purposes of the Act, the terms "medicine" and "medical" included dentistry, pharmacy, hospitalization, and nursing. (Note — Not specifically including veterinary medicine is difficult to rationalize!)

★ ★ ★ ★

Dr. C. K. Mingle, ARS, U.S.D.A., has been appointed as head of the **national program to eradicate bovine brucellosis**, succeeding Dr. A.K. Kuttler, effective March 11. Dr. Mingle has been active in the brucellosis program for 19 years and is internationally recognized as an authority on brucellosis. Dr. Kuttler becomes head of the state-federal cooperative work in livestock disease eradication and related activities in Utah, with headquarters in Salt Lake City.



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Electroejaculation in the Bull

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ELECTRONIC ejaculation of animals is not a new technique. Stimulation of the ejaculatory centers by passing an electrical current through the regions of the posterior mesenteric plexus and anatomically related sympathetic-parasympathetic ganglia has been used for many years to enable the researcher to study semen regardless of the sexual response of the animal in question.

LITERATURE CITED

The work of Gunn¹ with sheep is well known and modifications of his apparatus have been developed by Duffee *et al.*² for animals other than sheep, such as chinchillas and foxes. Laplaud *et al.*^{3,4} have also published information on the subject, their work dealing with the bull. An excellent review of literature on this subject was recently presented by Dziuk, Graham, and Petersen.⁵

Marden⁶ reported on the development of an electronic ejaculator having a power unit which delivers a critical pulse wave through a rectal electrode consisting of a single lucite cylinder into which four brass electrodes are inlaid longitudinally. Much of his experimental work had to do with finding the optimum electric pulse necessary for erection and ejaculation while subjecting the animal to the least physical stress. This instrument has been used to obtain semen samples from a large number of both dairy and beef bulls over the past 18 months. Information regarding physiological reactions and quality of semen has been assembled and is herein reported.

MATERIALS AND METHODS

During the period from April, 1954, to June, 1955, 690 beef bulls were subjected to electronic

ejaculation. The semen samples collected were used as one of the criteria for evaluation of these bulls for breeding soundness. Most of them were registered animals of the beef breeds (so-called "range bulls") used as herd sires in relatively large commercial and purebred herds throughout Colorado and Wyoming. The samples were collected on the respective ranches by a staff veterinarian, examined under controlled temperature, and given progressive numerical ratings for concentration (1 to 5), for percentage motile (1 to 6), and for percent alive (less than 25%, 25 to 50%, more than 50%). The percentage of living sperm cells was estimated by employing the eosin B and fast green live-dead staining technique.

The quantity of semen ejaculated by electrical stimulation varied considerably between bulls, as is experienced also during collection with the artificial vagina. However, the operator may allow more accessory gland fluid to enter the collecting vial at one time than at another, thus the final volume obtained is governed by his choice and skill. In order to present a comparison of the efficacy of the two methods of collection, part of the data presented here were assembled at the artificial insemination unit. Collections from 6 dairy bulls were made routinely by the same personnel week after week. The pH was determined within a few minutes after collection. Morphological studies indicated that there was no difference in any particular cell type from that observed in semen collected with the artificial vagina.

Semen from 1 mature Guernsey bull, unable to mount the teaser cow at times due to a leg injury, was collected intermittently with the aid of an electronic ejaculator over a period of seven months. Nonreturn rates on a 60- to 90-day basis were computed for those samples collected electronically as well as those collected by the artificial vagina during the same period.

Restraint.—The bulls were usually confined in the regular cattle chute available at the ranch; however, some bulls were merely tied with a halter, placed in a breeding stall, or confined to an alleyway.

From the Artificial Insemination and Bull Testing Unit and the Endocrine Section, Colorado A. & M. Experiment Station, Fort Collins.

This work was supported in part by the Dairy Husbandry Research Branch, U.S.D.A., Beltsville, Md., and the National Institutes of Health, Public Health Service.



Fig. 1—The apparatus used for electroejaculation of bulls.

Preparation of Animal.—The preputial hair was usually clipped and the area of the preputial orifice cleansed so that a clean sample of semen would be obtained from the occasional bull which does not protrude the penis.

Insertion of Electrode.—During the early trials with some of the first models, the rectum was irrigated with warm saline solution to clean it of fecal material and also to enhance the electrical conductivity through the rectal wall. However, when great numbers of bulls were being assembled for electroejaculation, time did not permit such preparation and this part of the technique was discarded. Now only a few bulls which do not respond readily are so treated. No particular lubricant was applied other than soapy, or just plain, water.

The electrode was inserted into the rectum, caution being taken that no current was passing through the instrument at the time the anal region was contacted. A slight amount of current was passed through the electrode as soon as it was within the rectal cavity to cause constriction of the anal sphincters and retention of the electrode. Only occasionally did an animal attempt to expel it after the first few moments.

If the current contacted the skin in the perianal region, the animal frequently voiced his dislike and even after the electrode had been pushed further into the rectum the bellowing sometimes continued.

One person was usually designated to stand in close proximity to the bull's hindquarters in order that he might watch the position of the electrode, although this is certainly not essential for operation of the machine.

Application of Stimulation.—No particular rhythm was used routinely, but each individual bull was observed by the operator of the machine, frequency and degree of stimulation being governed

by physiological response. The "power" switch, which controls the voltage being discharged by the electrode, and the "synchronizer" switch, which controls the frequency of the impulses being delivered, were initially set low on the scale (fig. 1).

Physiologically, as the electrical impulses pass through the individual, certain manifestations appear, indicating the degree of sensation being brought about. Ideally, the animal begins to show muscular contractions of the back which tend to draw the hindquarters toward the forequarters, resulting in a mild hunching action. Soon, seminal fluid drips from the prepuce, just as occurs during the sexual excitement stage of a bull being readied for natural service. As the potentiometer control is moved further to the right, more current passes through the animal and the hunches become more powerful and jerky ($\frac{1}{2}$ to $\frac{3}{4}$ minute and 10 to 12 stimuli are usually required to reach this stage). Next, when the penis begins to appear at the preputial orifice, the potentiometer is turned a little higher, to about half its total capacity. As erection of the penis and progressive protrusion occurs, the seminal fluid becomes more opaque. At this moment, the tip of the penis should be covered by a collecting funnel. As the stimulus is increased in degree and frequency, the opaque, sperm-laden fraction of the semen flows into the collecting vial.

(Note: This particular phase of the collecting procedure is extremely important as the volume and final concentration of the ejaculate depends to a large degree on what type of fluids are collected.) As the power control is returned to the "off" position, the penis is retracted just as following natural service. The entire procedure usually requires one to four minutes. Precautions for protecting the semen against adverse conditions such as bright sunlight or cold shock should be taken.

RESULTS

Semen Quality.—Tables 1 and 2 indicate the range of quality of semen collected from 690 bulls. More than half of the samples collected from the 8- to 11-month-old group were classified within the lower ranges of the quality scale, as would be expected from immature bulls producing "calvey" semen. The majority of samples examined among the older age groups fell within the higher, more satisfactory, classifications.

It is of interest that approximately 30 per cent of the 70 young Hereford bulls (8-10 mo. old) examined did produce semen of acceptable motility and per cent alive according to the classification scale used. All of these bulls were maintained in an experimental herd where the effects of in-breeding and out-crossing are being studied. Evidence indicates that the variations in semen quality in early sexual maturity may be due to genetic factors.

The average pH of 125 semen samples (table 3) collected electronically from 7 mature dairy bulls and 50 younger beef bulls was slightly higher than 99 samples collected from 14 different dairy bulls with the artificial vagina during approximately the same period. It is doubtful if this small difference would influence longevity of fluid semen in storage.

As has been mentioned, the volume of a particular sample is for the most part dependent upon the person collecting the ejaculated fluid. It is apparent, however, that as the characteristic pattern of ejaculation of a particular bull becomes known to the operator, a semen sample "typical" of that bull can be collected.

The amino acid and fructose content and

the fructolysis rate of semen samples so collected have been determined, and the pattern has been found to compare favorably with that of semen collected with the artificial vagina.

The data on nonreturn rates of semen collected electronically as compared with that collected with the artificial vagina from the same bull are being evaluated, but there are no indications that there will be any difference in the fertilizing capacity. Dziuk *et al.*² reported no appreciable difference in conception rates on 2,129 first services with electroejaculated semen from 3 bulls as compared with the over-all conception rate of these same bulls for the previous year, when such samples were collected with the artificial vagina.

DISCUSSION

Deviations from the "Ideal Reaction."

Physical Attitude.—The most common aberration probably is an uncontrollable, jerky extension of one of the hindlegs, the right hindleg having been involved most frequently. This extension is sudden and occurs at the moment the potentiometer is turned to or beyond a point, this point being quite constant for individuals but varying between bulls. Occasionally, when the power switch is moved up a step or two, the back muscles contract with such force as to lift the hindquarters free of the ground entirely, the animal literally standing on its front feet.

Some bulls appear to exhibit exhaustion of certain muscles and instead of the limbs returning to their normal relationship after each forced extension, they buckle anteriorly at the fetlock and the animal lies down. If the stimuli are continued while the bull is in this position, the legs are

TABLE 1—Quality of Bull Semen Obtained by Electroejaculation

Breed	Age	No. No.		Motility rating						Concentration					Viability		
		ejac.		1	2	3	4	5	6	1	2	3	4	5	<25	25-50	>50
Charolais	8 to 11 months	1	1	—	—	—	—	1	—	—	—	—	1	—	—	—	1
Hereford		70	74	43	1	8	21	1	—	54	17	3	—	—	44	8	22
Polled		6	6	1	2	1	2	—	—	—	3	3	—	—	—	3	3
Hereford		77	81	44	3	9	23	2	—	54	20	6	1	—	44	11	26
Total																	
Per cent				54	4	11	28	3	—	66	24	7	3	—	54	13	33
Angus	1 to 2½ years	51	61	8	1	1	20	30	1	12	14	7	26	2	5	3	55
Charolais		9	9	2	—	—	3	4	—	2	—	5	2	—	2	—	7
Hereford		92	114	12	5	7	29	58	3	14	15	18	63	4	18	6	90
Polled		15	16	—	—	—	3	12	1	1	1	5	9	—	—	—	16
Hereford																	
Total		167	200	22	6	8	55	104	5	29	30	35	100	6	23	9	168
Per cent				11	3	4	28	52	2	15	15	17	50	3	12	4	84

TABLE 2—Quality of Bull Semen Obtained by Electroejaculation

Breed	Age	No. bulls	No. ejac.	Motility rating						Concentration					Viability		
				1	2	3	4	5	6	1	2	3	4	5	<25	25-50	>50
Angus	2½ to 5 years	93	113	7	6	4	34	58	4	14	23	17	55	4	13	6	94
Hereford		215	252	16	12	6	100	110	8	23	58	39	125	7	21	9	222
Polled																	
Hereford		55	66	4	3	4	23	30	2	6	11	10	39	—	5	3	58
Total		363	431	27	21	14	157	198	14	43	92	66	219	11	39	18	374
Per cent		....	....	6	5	3	37	46	3	11	21	15	50	3	9	4	87
Angus	Over 5 years	16	18	4	1	—	5	8	—	4	3	3	8	—	4	—	14
Charolais		2	4	—	—	2	2	—	—	—	2	2	—	—	—	—	4
Hereford		55	67	3	7	3	19	34	1	6	10	12	38	1	4	5	58
Polled																	
Hereford		10	10	—	—	—	3	4	3	—	1	—	8	1	—	—	10
Total		83	99	7	8	5	29	46	4	10	14	17	56	2	8	5	86
Per cent		....	....	7	8	5	29	47	4	10	14	17	57	2	8	5	87

then extended and no real trouble is encountered, the collection being carried out with the bull on his side. The front legs are rarely involved, but if a bull is subjected to a prolonged series of impulses over a period of ten to 12 minutes, the fetlock and knee do exhibit spontaneous flexion, and the animal may go down with the knees on the floor.

Bulls that are handled roughly while being placed in a restraining device sometimes become overly excited and begin to bellow as soon as the electrode is placed in the rectum. If the electrical current is not turned off completely enough, sensation may pass into the skin of the anal region to exaggerate this fear reaction. Few animals bellow if the first sensations are transmitted through the rectal wall itself, although bellowing may occur if the higher power settings are ultimately necessary to bring about ejaculation.

Erection and Protusion of the Penis.—The penis may be protruded without the engorgement, congestion, and visible color changes indicative of physiological erection. In such instances, "true" erection will usually occur as slightly more stimulation is applied.

Erection may occur without the penis protruding from the preputial orifice; in fact, on occasions the penis is retracted with each application of stimulus. This may sometimes be corrected by moving the electrode further ahead or withdrawing it a distance within the rectum. If this procedure fails, the penis should be forced out by an assistant applying pressure to the curvature of the sigmoid flexure as it is palpated just above the testes, in the neck of the scrotum. Once the penis is moving freely through the prepuce, then the

stimulus will usually be sufficient to keep it extruded. Sometimes the tip of the erect penis enters a diverticulum at the anterior extremity of the prepuce and does not appear externally. This is most commonly encountered in the polled breeds. Ejaculation may occur while the penis is so located and the ejaculated material be lost to the collector.

Ejaculation and Collection.—If a clean sample of semen is to be collected, it is most important that the penis be extended and the ejaculation collected without the collecting device contacting anything other than the free end of the penis.

Ejaculation may occur without the penis being erect. In such cases, the semen often collects in a pocket of the prepuce and drips from the area only when the bull is moved away or the preputial area is palpated.

TABLE 3—Effect of Electroejaculation of pH of Bull Semen

Dairy breed	Artificial vagina			
	No. bulls	No. ejac.	Ave. vol.	Ave. pH
Holstein-Friesian	5	35	7.76	6.63
Brown Swiss	4	23	6.59	6.68
Jersey	2	10	4.54	6.97
Guernsey	2	21	5.9	6.77
Milking Shorthorn	1	10	6.65	6.79
Total	14	99	6.65	6.72
Breed	Electroejaculation			
	No. bulls	No. ejac.	Ave. vol.	Ave. pH
Holstein-Friesian	1	1	5.00	6.80
Brown Swiss	1	11	4.56	7.12
Jersey	2	27	3.31	7.24
Guernsey	1	11	4.95	6.85
Milking Shorthorn	2	25	4.09	7.15
Total	7	75	4.02	7.13
Beef breed				
Hereford	30	30	—	6.88
Angus	13	13	—	6.83
Charolais	7	7	—	7.30
Total	50	50	—	6.92

Occasionally, neither erection nor ejaculation becomes apparent even though the degree of power is more than that ordinarily used. In such cases, it is best to rearrange the electrode in the rectum, fill the rectum around the electrode with warm water, set the power back to the lower position, and begin the series of stimuli again at a different frequency. Such bulls may require two or three series of "treatments," each consisting of increasing the power to a point where physical reaction may appear uncomfortable, then a rest of two to three minutes, and another treatment applied.

Occasionally a normal bull will not ejaculate spermatozoa, the collected material consisting of fluid containing a few sperm cells, foreign debris, and a considerable number of epithelial cells. Massage of the ampulla of the vas deferens *per rectum* when the animal is at this stage will sometimes enable the operator to collect a satisfactory sample. Otherwise, if such bulls are again subjected to the electrical stimulation an hour, a day, or a week later, a normal semen sample can usually be collected.

Two, three or, in some instances, even more ejaculations have been collected from a given bull within five to ten minutes. The success of such multiple ejaculatory attempts depends on individual response. In some instances, successive ejaculations become more and more difficult, while in others the second and third ejaculations are more readily delivered, with little or no change being made with the controls. Rarely, a particular bull will exhibit ataxia for a short time if numerous successive series of high power stimuli are necessary to collect the sample.

Studies on 4 bulls subjected to ejaculatory exhaustion by this means indicate that as many as 35 collections totaling 196 cc. may be taken from a bull within 75 minutes without any adverse effect on the animal during or after the collecting process.

Conditioned Reflex Action.—Of the 7 dairy bulls from which collections were taken routinely, 2 have shown apprehension as soon as the operator grasped the tail preparatory to inserting the electrode. This nervous attitude usually subsides as soon as the impulses are delivered rhythmically and, therefore, does not interfere with the collection process.

In general, none of the bulls ejaculated electronically showed any noticeable after-effects. Neither undue discomfort nor latent excitement was observed. The slight increase in respiration rate and mild salivation subsided almost immediately. The bull's mobility was seldom affected. Erection, protrusion of the penis, and ejaculation of semen representative of capacity of the particular bull occurred in 90 to 95 per cent of the bulls in this trial.

The fact that erection and protrusion of the penis can be brought about in such a high percentage of the animals so treated makes this instrument a valuable aid in the observation of pathological conditions of the penis and preputial membranes. Adhesions subsequent to penile surgery may frequently be prevented by causing daily protrusion of the penis in this manner.

SUMMARY AND CONCLUSIONS

A new electronic ejaculator has been used to collect 811 ejaculations from 690 bulls representing all ages of both beef and dairy animals. Information on five physical criteria of semen quality (volume, concentration, per cent alive, viability, and pH) indicates that there is no appreciable difference between semen samples collected electronically and those collected with the artificial vagina.

Detailed observations of clinical response to such a method of semen collection revealed no adverse effect from a single series of stimuli or multiple series being applied within a few minutes of each other. In an estimated 90 to 95 per cent of the bulls tested, erection, protrusion of the penis, and ejaculation of semen representative of that bull's reproductive capacity occurred. The majority responded in a calm manner, exhibiting little or no undesirable physical stress.

Although such a method of collecting semen is extremely valuable, it does not, in the authors' opinion, replace the use of the artificial vagina in a bull stud operation. Those bulls which will readily serve the artificial vagina will more consistently deliver semen of the quality and quantity that the individual is potentially capable of producing, with less inconvenience. However, the value of using such a technique, under certain situations, is readily

apparent and may well be the only means by which a great herd sire could be used.

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Practical Sanitation

We were pleased to see the following paragraph in the July 25, 1955, issue of *Hoard's Dairyman* (p. 670):

If you decide to bury the animal, dig a 6-foot hole as close to the carcass as possible. Roll the carcass into the hole and cover it with a layer of lime. Then throw in the dirt from the ground where the animal was lying. This dirt often contains disease germs that other animals will pick up. Finally fill the hole with clean soil.

Always wear rubber gloves and boots when you handle dead animals. They may have had an infectious disease. To prevent the spread of germs, move the carcass as little as possible.

This common sense advice on sanitation might not have caused comment had we not recently seen some violations of sanitation in films prepared to popularize certain animal disease control products. In one film, a well-dressed individual (at least he was wearing a white gown, rubber gloves, and highly polished, unprotected dress shoes) was crouched over and "posting" a pig. In another film, an otherwise properly attired individual was paddling around in hog pens without boots or washable footwear. If he was not a resident of this farm, we hope he left his shoes there when he departed.

Occasionally, we see a sketch showing the veterinarian properly clad but with his emergency bag sitting, of all places, on the barn floor.

A chain is no stronger than its weakest link, so why drag a carcass around and then bury it, leaving its discharges to contaminate other animals? Or why put on a sanitation act with white gown and gloves but ignore boots and contaminated equipment? Sanitation is to infectious disease control as asepsis is to surgery. Such violations of practical sanitation are embarrassing to the practicing veterinarian who should, and does, assume the responsibility of teaching sanitation to his clients. Actions always speak louder than words.

Annual Purebred Livestock Review

In 1955, 86 purebred associations registered 2 per cent fewer animals than the 1,830,182 all-time high registrations of 1954. This is nearly 50 per cent more than in 1946.

The older beef cattle breeds all showed a decrease; the Charolais and Charbray showed small increases while the Brangus registrations nearly doubled. Herefords led with 58 per cent of the beef cattle registrations.

Almost all breeds of swine showed an increase, especially Yorkshires and Tamworths, while Landrace registrations increased from 1,912 in 1954 to 5,580.

Sheep held their own with one of four registrations being Hampshires and one of six being Suffolks.

Thoroughbred, Standardbred, and Quarter horses all showed an increase in registrations while Shetland ponies increased 50 per cent and Welsh ponies nearly 100 per cent.—*Breeder's Gazette*, March, 1956.

Cytopathogenicity of Animal Viruses

The action of viruses on cells in tissue culture was classified as follows: not cytopathogenic (mumps, influenza); moderately cytopathogenic (psittacosis, fowlpox, Newcastle disease, Aujeszky's disease); markedly pathogenic (equine encephalomyelitis, poliomyelitis); pathogenic for the cells of neoplasms (eastern equine encephalomyelitis, influenza).—*Vet. Bull.*, Jan., 1956.

Radiographic Demonstration of Dwarf Gene-Carrier Beef Animals

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WITHIN THE PAST 20 years, some quality in the conformation of the dwarf gene-carrier beef animal caught the fancy of the beef cattle breeder. This quality, and unwittingly the associated dwarf gene, was promoted by beef cattle judges when they favored such animals in the various stock shows. The meat-packing industry added fuel to the fire when they paid premium prices for these animals because of evidence that they had a higher dressing percentage than dwarf-free individuals.

ATELIOTIC DWARFS

At first the appearance of dwarf calves in a herd was considered unimportant. They were believed to be ateliotic dwarfs,¹ or so-called "midgets" or "Tom Thumb" dwarfs, which occur approximately once in 100,000 births and are of no particular significance.

The Aberdeen Angus heifer calf shown in figure 1 weighed 18 lb. at birth (no dystocia here) and appeared normal in every respect. At 38 days of age, when radiographed and photographed, she weighed 42 lb. The thoracic and lumbar spines appeared normal on her skiagraph. She is still in the Iowa State College beef herd and, on Sept. 9, 1955, was 2 years old. She is normal except that she is about the size of an average yearling.

OSTEOCHONDRODYSPLASTIC-LIKE DWARFS

The type of dwarfism with which we are principally concerned is shown in figure 2. This male calf is the offspring of normal-looking parents which conform to the type breeders selected for propagation about two decades ago. He weighed 25 lb. at birth but was not photographed until 10 days of age when it became apparent that he was not normal. He then weighed 42½ lb.

Radiographs showed the typical com-



Fig. 1—An ateliotic or "Tom Thumb" dwarf Aberdeen Angus heifer calf which weighed 42 lb. at 38 days of age; 18 lb. at birth. She is a miniature normal animal.

pression of the thoracolumbar spine region seen in this type of dwarfism. The calf died at 32 days of age and, just before death, walked in circles, the direction depending on which way he got started. There was no evidence of bloating prior to death.

At necropsy, excessive fluid was observed in the lateral ventricles of the brain and

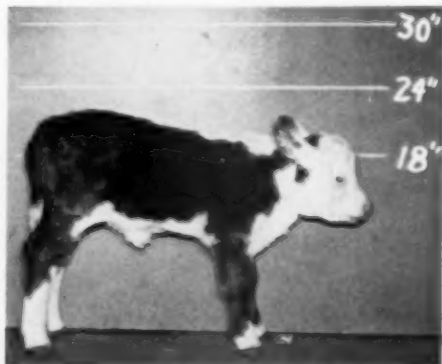


Fig. 2—A "snorter" dwarf which simulates the osteochondrodysplastic type of dwarfism in man and some of the lower animals. This calf weighed 25 lb. at birth and 42½ lb. at 10 days of age when this picture was taken.

Professor and head, Department of Veterinary Obstetrics and Radiology, Division of Veterinary Medicine (Emmerson); and professor of Animal Husbandry in Animal Breeding, Division of Agriculture (Hazel), Iowa State College, Ames.

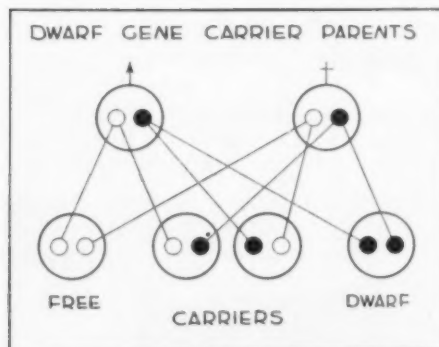


Fig. 3—A graphic illustration showing the ratio of normal calves, dwarf gene carriers, and dwarfs produced when dwarf gene-carrier parents are mated.

the pituitary gland was cystic. The cause of death recorded by the pathologist was pneumonia.

This type of dwarfism simulates the osteochondrodystrophic type of man and other animals.¹ Genetically, it is conditioned by a simple autosomal recessive gene.²

INCREASE IN APPEARANCE OF OSTEOCHONDRODYSTROPHIC-LIKE DWARFISM

A few years ago, the beef cattle breeder who discovered an occasional dwarf of this type in his calf crop knew from practical experience that these calves died early or, if they lived, they did not do well. If he was a producer of breeding livestock, their presence jeopardized the sale price of his breeding animals; consequently, he disposed of such calves and kept no record

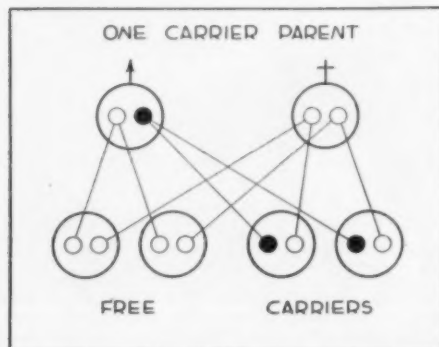


Fig. 4—A graphic illustration of how a dwarf gene-carrier sire introduced into a herd fails to produce any dwarfs in the first calf crop.

of their frequency of occurrence. One breeder is said to have made weekly inspections of his spring calf crop and shot every dwarf that he found. What most of the breeders who tried to cover up this type of dwarfism in their herds did not understand was that their herd cows and sires carried the dwarf gene and would certainly continue to produce dwarf calves in about the ratio shown¹ (fig. 3).

When both parents are dwarf gene carriers, if they produce in the characteristic manner, there will be 1 dwarf gene-free calf, 2 dwarf gene-carrier calves, and 1 dwarf calf in each 4 offspring.⁴ However, the offspring of such parents do not always occur in this ratio. It is possible for the dwarf gene-carrier parents to produce 6 or 8 calves in a row which are normal in appearance; however, the majority of them will be dwarf gene carriers. On the other hand, it is possible for such parents to produce as many as 4 dwarf calves in a row. This inconsistency can best be illustrated by flipping a coin. If done only ten times, it is possible for all ten to be heads or tails. However, if flipped 100 times, it will approach a 50-50 ratio.

The introduction of a dwarf gene-carrier sire into an otherwise dwarf gene-free herd will not produce dwarfs in the first generation of calves,⁴ but 50 per cent of the calves will be dwarf gene carriers (fig. 4). Not until the second generation when dwarf gene-carrier female offspring are mated with dwarf gene-carrier male offspring will the dwarf calf appear. In 1946, I first saw a so-called "compressed" beef animal. She was suffering from dystocia and when the calf was delivered it looked like a dwarf. Later, when a radiograph of this dwarf calf was made, the peculiar appearance of the lumbar vertebrae was noticed, especially on the lateral view. When shown to colleagues, they became interested.

In 1949, the American Hereford Breeders Association decided to support a research program on dwarfism at various colleges and universities and, as a result of the proposed approach to the problem (submitted by Drs. Lush, Hazel, and Emmerson in 1951), we were given a grant for our dwarfism project. The collection of a herd of known dwarf gene-carrier cows and bulls was then started.

The original herd consisted of 36 cows and 3 bulls. Radiographic studies were

started in the fall of 1952 but, since most of the cows were already pregnant, our controlled breeding program did not yield results until 1953 when the first calves dropped were old enough to be bred. Most of the calves born in the spring of 1953 were by unknown sires. However, each calf was radiographed and the 32 calves were classified as follows: 8 dwarfs, 20 carriers, and 4 dwarf gene-free. We were sure about the dwarfs, but not about the others. It is much easier to determine genotype in bulls than in heifers.

Eight bull calves born in 1953 were classified, radiographically, as carriers. Five of them have now been tested genetically and have proved to be carriers. The remaining 3 have not yet proved to be carriers but 1 has sired only 1 calf, another only 5 calves, and the third only 6 calves. The 5 that proved themselves to be carriers did so on three, four, six, six, and six matings.

Lush and Hazel⁴ say that a bull can be proved a noncarrier of the dwarf gene in one year, only if he is mated to a minimum of 15 known dwarf gene-carrier cows and fails to produce a single dwarf.

We did not have enough dwarf gene-carrier cows to test-breed all the radiographically classified carrier bulls, so neighboring institutions conducting dwarfism research work were asked to test-breed some of our bulls. The bull shown here (fig. 5) was tested for us by the University of Nebraska. On his radiographic classification at 10 days of age, two of us thought he was free, one classified him as a carrier. He proved to be a carrier.

The mortality among dwarfs is high. A colleague⁵ estimates that, if allowed to live, 60 to 75 per cent would die by weaning time, and 95 per cent by 2½ years of age. A dwarf heifer born in 1953 and bred last fall to a dwarf gene-carrier bull is shown (fig. 6) just before her calf was delivered by cesarean section on March 27, 1955, and four months later (fig. 7) with her normal-appearing calf. A dwarf gene-carrier sire and a dwarf dam can produce 2 dwarf gene-carrier offspring, and 2 dwarfs in four matings (fig. 8). Radiographically, when 2 days old, this calf was classified as a dwarf gene carrier.

If both parents are dwarfs, the offspring will be 100 per cent dwarfs. This has been proved by Pahnish *et al.*⁶ in Arizona.



Fig. 5—A dwarf gene-carrier sire, proved genetically. His radiographs at 10 days of age could easily have been interpreted as a dwarf gene-free type. His general appearance and conformation would not lead one to suspect that he carried the dwarf gene.

This illustrates how difficult it is to maintain dwarf breeding stock. In 1953, when we did not have a Hereford dwarf bull old enough to serve cows, an Aberdeen Angus dwarf bull (fig. 9) was mated to 17 females, 13 of which were proved dwarf gene-carrier cows, 1 unknown, and 3 dwarf gene-free cows. Not one of the 17 calves sired by him was a dwarf; however, 15 had typical dwarf gene-carrier radiographs, 1 had a dwarf gene-free radiograph and 1, which was not physically a dwarf, had a typical dwarf radiograph. Perhaps this Aberdeen Angus bull has a different type of dwarfism from the type being studied in the Hereford breed. His crossbred calves



Fig. 6—A dwarf heifer, bred to a known dwarf gene-carrier bull, just prior to delivery of her calf by cesarean section.

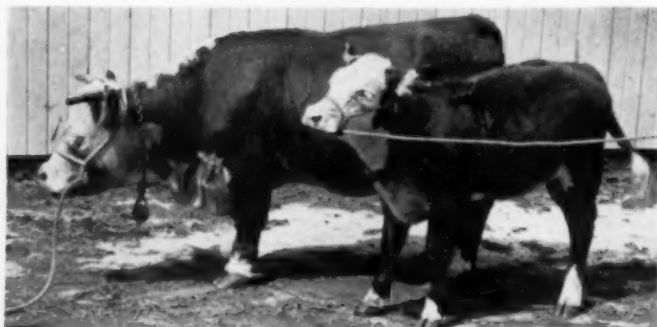


Fig. 7—The same heifer shown in figure 6, with her 4-month-old, normal-appearing calf which was classified as a dwarf gene carrier (see fig. 8).

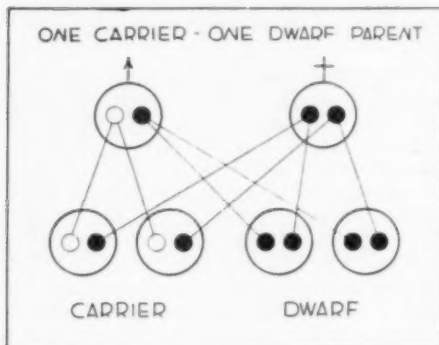


Fig. 8—When a dwarf gene-carrier bull is mated to a dwarf cow, or vice versa, only a dwarf or a dwarf gene-carrier offspring can result.

are not being saved for future test breedings, because of crowded facilities.

Many of our test animals have now been bred to 2 dwarf bulls (fig. 10) and will calve during the spring of 1956. Since

there is a preference among breeders for the conformation shown by the dwarf gene carrier, we hope to retain this conformation by selecting the 1 in 4 offspring from carrier parents that is classified as dwarf gene-free, and using them as foundation stock for a dwarf gene-free herd.

It is believed that the best method to test heifers is to breed them to dwarf bulls. If in four gestations they fail to produce a dwarf calf, they can be genetically classified as dwarf gene-free.

When all three types are shown together (fig. 11), the dwarf is easily distinguished but the other 2 are not. The heifer in the middle (fig. 11), a dwarf gene carrier (see fig. 7), is 10 days older than the dwarf, and the dwarf is 9 days older than the heifer on the right, which is out of a carrier cow but was classified as dwarf gene-free. The dwarf is a bull.

THE ROLE OF THE RADIOLOGIST

From our research thus far, the radio-

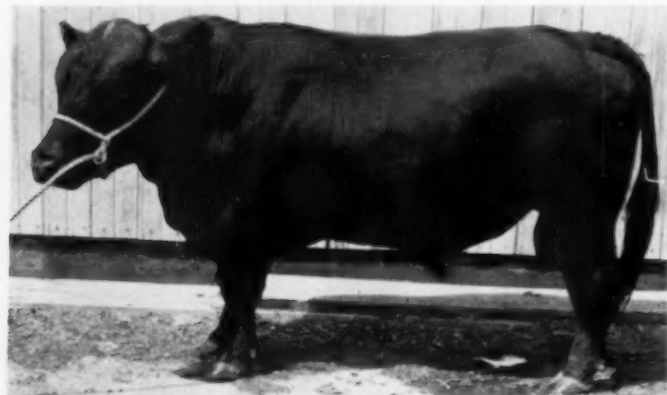
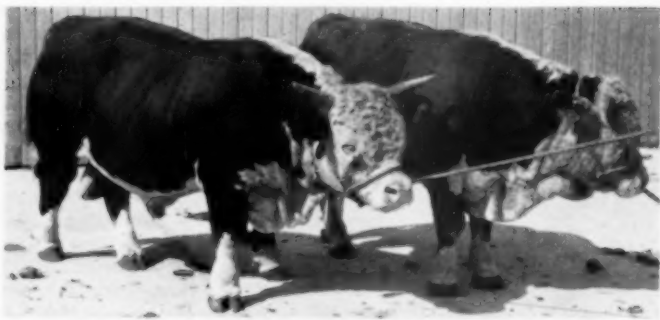


Fig. 9—A dwarf Aberdeen Angus bull which may not represent the same type of dwarfism known as the "snorter" type in the Hereford breed.

Fig. 10—Two dwarf Hereford bulls now being used in the test-breeding program.



graphic method shows promise of being the most accurate for early detection of the dwarf gene carrier, even more so than the profilometer.³ Test breeding is the most accurate method⁴ but it requires much time. While the present-day x-ray machine that the practitioner can afford for use in his practice is not powerful enough to use on adult beef animals, it is satisfactory for use on calves.

Most of our calves are radiographed at 1 week of age or younger. Radiographing calves at this age has several advantages: (1) Calves are easier to handle; (2) their rumens are not yet filled with gas and ingesta; (3) the characteristic telltale defects tend to be partially corrected as the animal gets older; (4) the early detection of genotype helps in deciding whether the calf will be saved for breeding or go into the feedlot; (5) if the radiographic classification is proved accurate by breeding tests, it will eliminate the long, tedious, and expensive method of test-breeding foundation stock in order to establish a dwarf gene-free herd. We should have fairly conclusive evidence of the reliability of the radiographic classification of beef calves for the so-called "snorter" type of dwarfism in another year or two. So far, our results give us the courage to make this preliminary report.

The breeder, to get his calf crop checked radiographically, must either go to his veterinarian or have his own x-ray unit. The veterinarian, therefore, must provide this service for his clients.

This is the radiographic technique we use. We have two x-ray machines: one is a shockproof Picker portable and the other is a shockproof mobile General Electric, model D-3. In both machines, we use 80 kv.p., 15-milliamperes (ma.), 36-inch



Fig. 11—Dwarf calf (left); a carrier (center); and a dwarf gene-free calf (right).

TFD with cone, Lysholm grid-front cassettes containing par-speed screens.

To get a 2-day-old calf into position for radiographing his thoracolumbar spine



Fig. 12—The calf, properly held by the owner, is being measured for the proper exposure which will be 0.1 of a second less than the number of inches between the two tuber coxae.



Fig. 13—For radiography, the calf is placed in lateral recumbency. The exposure is made at expiration or, if breathing is fast, the nostrils are gently held shut at the height of inspiration and the exposure made promptly.

(Note—This photograph was posed and, through an oversight, lead rubber aprons and lead-lined gloves were not worn.)

7 inches, the exposure is 0.6 of a second, using the aforementioned technique. If the distance is 6 inches, the exposure is 0.5 of a second. We have motor-driven synchronous timers on both of our machines. The first second is marked off in tenths. For young calves, the longest exposure has been 0.6 of a second.

Place the calf gently on the cassette (fig. 13) so that all the lumbar and the terminal thoracic vertebrae will be radiographed. Until accustomed to interpreting the films, it is best to use 14- by 17-inch cassettes. If the calf is not breathing too hard, make the exposure at the height of expiration; otherwise, gently cover the nostrils with your hand to stop breathing at the height of inspiration and immediately make the exposure. Process the film in the usual way.

The individuals holding the calf and taking the picture must be protected from the scattered radiation by proper protective devices.

The radiograph of the thoracolumbar spine of a dwarf gene carrier is shown (fig. 14).

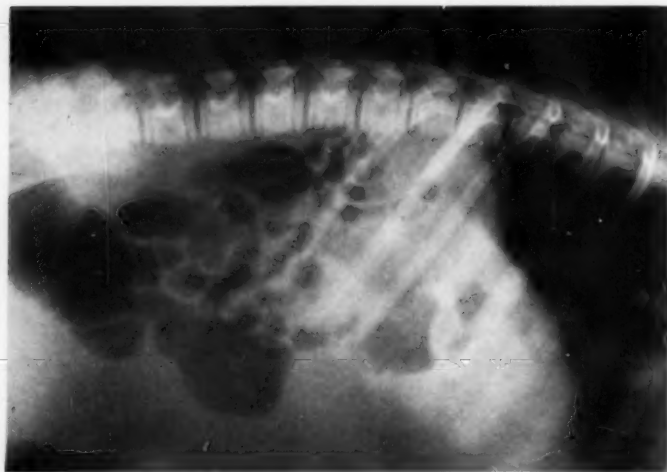


Fig. 14—This is the radiograph of the calf shown in figures 12 and 13. Is he free of the dwarf gene, or is he a carrier? See text for the radiographic classification.

without excitement, we have the owner hold the calf (fig. 12). This method minimizes the struggling and avoids an increased respiratory motion and an uninterpretable radiograph.

Measure the distance from tuber coxa to tuber coxa (fig. 12). If the distance is

HOW TO IDENTIFY A CARRIER

To classify an animal as a dwarf gene-carrier calf, examine the thoracolumbar spine. First, on the lateral view, look for evidence of longitudinal compression of the bodies of the last four or five thoracic vertebrae and all of the lumbar vertebrae

Most noticeable are the undulations on the ventral profile of these vertebrae. These undulations, together with the straightness of the ventral profile of the body of the vertebrae, which is arched dorsally in the dwarf gene-free individual, are thought to be evidence of longitudinal compression of the body. This compression of the body of the vertebrae occurs during the cartilaginous stage and possibly the early intramembranous stage of bone development⁷ which are in the middle and latter parts of the gestation period. In this region, the very powerful longissimus dorsi and psoas major muscles, especially in the meat-type animal, exert a great part of their contractile force on these vertebrae.

During the intramembranous phase of calcium deposition in the cortical part of the body of the vertebrae, the undulating or folded nature of the calcium deposits creates linear areas of increased density corresponding to the position of the areas of greatest compression. There seems to be an over-all shortening of the body of the lumbar vertebrae with a corresponding increase in the depth. As a result, the epiphyses do not appear to cover, *in toto*, their corresponding metaphyses. Sometimes, but not always, the metaphysis seems to be wedge-shaped in outline rather than rectangular. Some of these features can best be visualized by examining prepared specimens of the lumbar vertebrae.

In a lateral view of three sets of five lumbar vertebrae (fig. 15), "A" is from a "snorter" dwarf calf; "B" is from a proved dwarf gene carrier; and "C" is from an animal we could classify as dwarf gene-free. Unfortunately, these specimens were not from animals of the same age.

Although a good ventrodorsal radiograph of the lumbar spinal region (fig. 16) is more difficult to obtain, it is often helpful in deciding the classification of the marginal animal. The specimen on the left (fig. 16) was taken from a true snorter dwarf. Compare the anterior curvature or "hooking" of the transverse processes with those of the dwarf gene-free specimen on the right. The degree of forward curvature or "hooking" in the carrier calf lies between these two extremes.

In so far as is possible in the selection of dwarf gene-free animals as calves to be raised for breeding purposes, we would like to retain the conformation that the

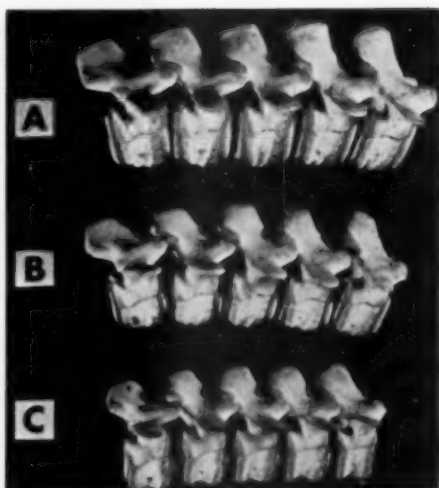


Fig. 15—Lateral view of five lumbar vertebrae carefully prepared from specimens from (A) dwarf calf, (B) dwarf gene-carrier calf, and (C) dwarf gene-free calf, according to the radiographic classification. The specimens were from calves of different ages.

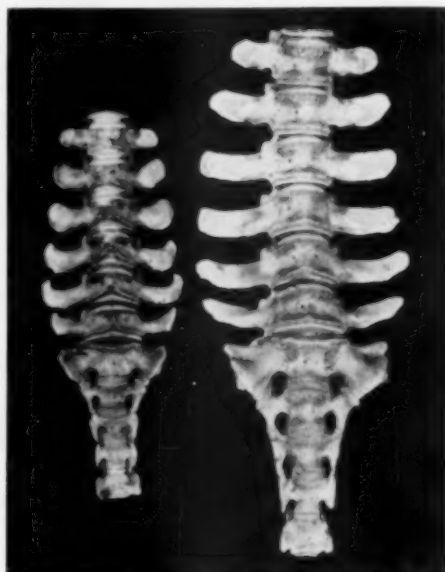


Fig. 16—Ventral view of the lumbosacral vertebrae of a dwarf (left) and a dwarf gene-free calf (right). These calves were closer to being the same age than the difference in size of the two specimens would indicate. Note the pronounced "hook" of the lumbar transverse processes. Sometimes a ventrodorsal radiograph reveals this "hooking" in an otherwise difficult x-ray picture to properly classify.

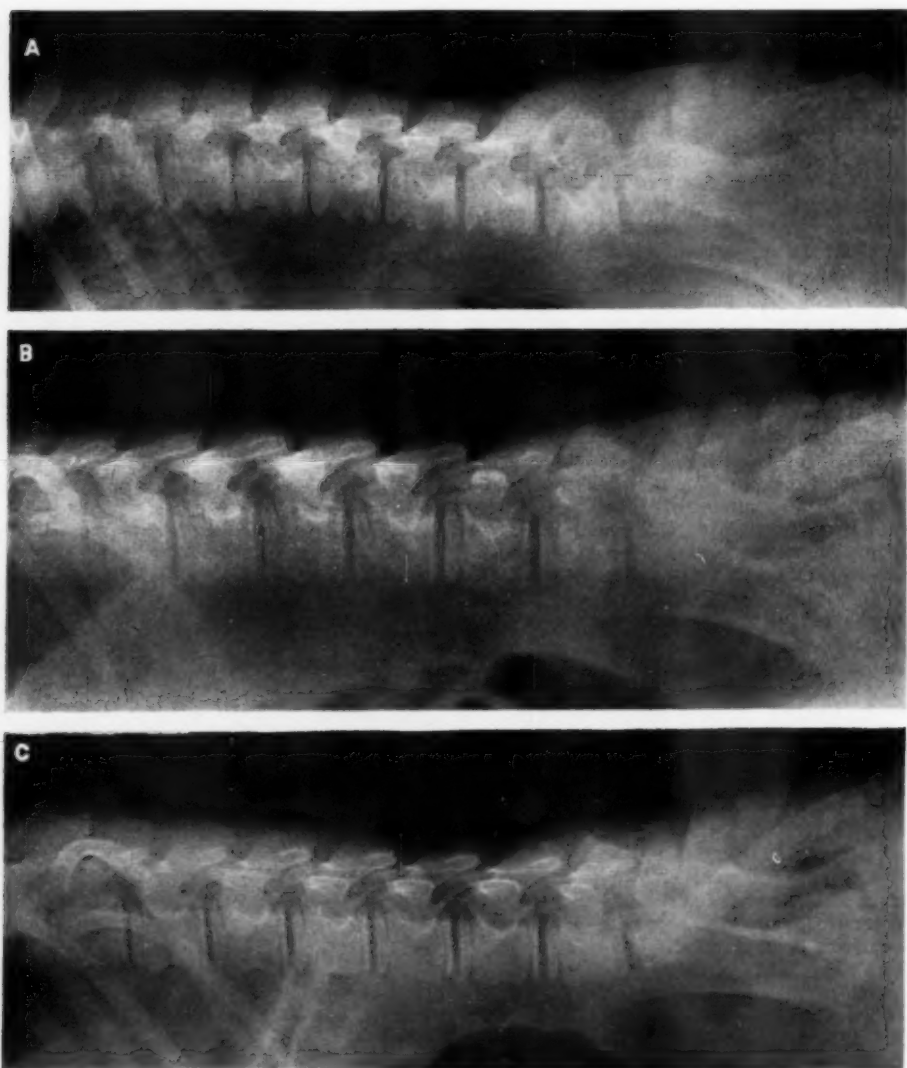


Fig. 17—Radiographs of the thoracolumbar spine, lateral view, of (A) typical "snorter" dwarf calf, (B) genetically proved dwarf gene-carrier calf; and (C) radiographically typed dwarf gene-free calf, not yet genetically proved. Note particularly the differences in the ventral profile of the bodies of the terminal thoracic and lumbar vertebrae.

breeder, beef cattle judge, and packer have favored over the past 20 years. It is doubtful that the small commercial breeder will ever attempt to free his herd of dwarf gene-carrier cows. However, it will be to his advantage to buy and use dwarf gene-free sires on his cows in order to avoid the production of profitless dwarfs.

In all probability, the breeders of purebred stock will go in for the production of dwarf gene-free herds.

If no effort is made to control dwarfism, or if a cheap, accurate method of eliminating it is not found, it will increase. Lush and Hazel⁴ estimate that if all herd sires used carry the dwarf gene, and we do noth-

ing but eliminate the easily detected dwarf, the incidence of dwarfism throughout the country will stabilize at 14.6 per cent of all calves dropped in a given year. If only 80.0 per cent of the bulls used prove to be carriers, the dwarf incidence will be 10.0 per cent; 50.0 per cent carrier bulls, 4.4 per cent dwarfs; 40.0 per cent carrier bulls, 3.0 per cent dwarfs; 20.0 per cent carrier bulls, less than 1.0 per cent dwarfs. In other words, at its worst it would not be as bad as other calfhood disease problems which are currently reported as taking 25.0 per cent of all calves born. Nevertheless, we should not ignore it.

For the sake of comparison, the lateral thoracolumbar radiographs (fig. 17) of the three types of calves which we are studying are shown: "A" is the typical snorter dwarf animal; "B" is the carrier type; and "C" is the dwarf gene-free individual.

Thus far, we have incriminated only two breeds of beef cattle. In order to show no partiality, we are including a picture (fig. 18) of 1 of 7 dwarf Shorthorn calves born in one herd this past spring, all sired by 1 bull. While this calf is not typical of the snorter-type dwarf, it is, nevertheless, a dwarf. The exact type of dwarfism has not yet been determined. In addition to the small size of this calf, he had other deformities, such as a short tail and failure of the formation of a cloven hoof on one front claw.

SUMMARY AND CONCLUSIONS

The osteochondrodystrophic-like type of dwarfism, commonly referred to as "snorter" or "acorn" dwarfs by the breeder, is conditioned by a simple autosomal recessive gene.

Its occurrence in certain beef breeds is of sufficient economic importance to warrant serious consideration by all interested in the welfare of the beef cattle industry.

The selection of breeding animals having conformations yielding the highest dressing percentages and receiving the greatest consideration from judges in the beef cattle shows is largely responsible for the increase in this type of dwarfism. The pinnacle of achievement will be reached when some economic method is developed permitting the detection of the dwarf gene-free individual that still possesses the aforementioned characteristics and that reproduces them consistently.



Fig. 18—One of the 7 dwarf Shorthorn calves sired by the same bull in one herd in one breeding season. It represents a different type of dwarfism from the so-called "snorter" type seen in Herefords.

One of many methods being studied that shows promise at the present time is the radiographic method. When the thoracolumbar spine of the 1- to 10-day-old calf is radiographed, evidence of longitudinal compression can be detected in the dwarf and dwarf gene carrier, but not in the dwarf gene-free individual.

The chief limitation in this method would seem to be the human element concerned in the interpretation of the x-ray films. These are gradually being overcome by correlating the interpretations with the results obtained in test breedings. The test-breeding program is of necessity a slow, tedious, and expensive process. The accuracy of the radiographic method as compared with the limited results thus far obtained in the test-breeding program has been well above any other method we have used. The results of many more test breedings are needed before the percentage of accuracy of the radiographic method can be stated.

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Sex Difference in Weight of Pigs.—A ten-year experiment involving 2,036 Hampshire pigs indicated that boars were 5 per cent heavier at birth than gilts and 3 per cent heavier at 21 to 180 days of age.—*J. Anim. Sci.*, Feb., 1956.

Endocrine Gland Changes and Reproductive Failures in Cows

Histological studies of the pituitary and adrenal glands, ovaries, and uteruses of cows with irregular or no estrous cycles revealed a decrease in the percentage of small *beta* and *alpha* cells in the pituitary; a high incidence of follicular atresia with faulty development of the follicles and corpora lutea of the ovaries; and a thin endometrium with some of the endometrial glands enlarged and surrounded by dense connective tissue.

Nymphomania was associated with two distinct conditions: (1) an increase in small *beta* cells of the pituitary gland, a hypertrophy of the fascicular zone of the adrenals, large numbers of follicles, and absence of corpora lutea in the ovaries; and (2) hyaline degeneration of the small *beta* cells, hypertrophy of the reticular zone of the adrenals, and few large follicles in the ovaries.

In 2 cows that showed no heat periods, the corpora lutea contained discrete areas of lymphoid cells while the small *beta* cells of the pituitary gland were vacuolated or contained large inclusions similar to those of pregnant cows.—*J. Dai. Sci.*, Feb., 1956.

Effects of Weaning Age on Swine

A comparison of the performance of pigs weaned when 4 days old to those weaned at 2 weeks or older shows: a livability of 31 per cent against 85 to 89 per cent for older pigs; an average weight at 9 weeks of 21.9 lb. against 23.9 lb. when weaned at 2 weeks, 40.2 lb. when weaned at 4 weeks, and 43.4 lb. when weaned at 9 weeks.

Of the sows, 57 per cent accepted service from the boar three to five days after farrowing, regardless of weaning, but none

conceived. The average time for conception after weaning was 32.7 days for the four-day group, about 16 days for the two- and four-week groups, and 5.8 days for the nine-week groups.

When sows were injected with diethylstilbestrol 24 hours after farrowing, all accepted service within three to four days but, again, none conceived.—*Ralston Purina Nutr. News Bull.*, Jan. 1956.

Breed Affinity in Fertilization

In a series of experimental matings in chickens, equal concentrations of spermatozoa from several males of four different breeds were mixed and inseminated into hens of the same four breeds. The volume of semen per ejaculation ranged from about 0.4 to 1.8 ml., and the spermatozoa concentration from about 1.3 to 3.1 million per cubic millimeter. Contrary to some previous findings, there was no evidence of affinity of sperm from a particular breed to fertilize ova in hens of the same breed.—*Poult. Sci.*, Nov., 1955.

Placental Transfer of Zinc in Rats

While absorption of zinc from the gastrointestinal tract was poor in rats, it moved freely through the placenta to the fetus at all stages of gestation. The fetal content of zinc reached a peak at the end of term. In lactating rats, more than half of the zinc absorbed from a dose was found in the milk in 96 hours.—*Vet. Bull.*, Jan., 1956.

Metal or Nylon Mesh in Tissue Repair

When tantalum, steel wire, or nylon mesh were used in surgical treatment of various large hernias in 36 persons, the wound healed by first intention in 30; by second intention in four; and in two (both steel wire) a second operation was necessary to remove the mesh. Even in these, the abdominal wall was not impaired because it had been strengthened by an extensive connective tissue reaction.

All three types of mesh were well tolerated but the steel wire less than the other two. The nylon mesh seemed superior since all 11 wounds in which it was used healed by first intention; the tantalum mesh had a tendency to break six to ten months after implantation.—*J. Am.M.A.*, Dec. 31, 1955.

A Disposable External Fixation Splint

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A fixation splint consists of an apparatus so designed that when applied to a broken bone, it will effectively absorb the forces which otherwise would cause movement of the fractured ends and prevent or interfere with proper union of the fracture. The Stader and Kirschner splints do this effectively through a system of fixable universal joints and bars which attach to pins driven into the members of a fractured bone.

The splint herein described utilizes the same basic principles of fracture fixation but with different materials. The pinning of the bone, the material, and the technique used are the same but the system employed in connecting the pins together to create a "force bypass" is different. The pins (2 or more) are connected to each other by a bar of plastic. The plastic used is the acrylic thermoplastic, plexiglass.

This plastic is characterized by great strength when at room temperature but is flexible when heated to a temperature of 300 to 350 F. Although flexible at this temperature, like rubber, it retains its general shape—that is, it does not flow or become sticky. It is easily handled and can be bent into any desired shape which, if held until cold, will be permanent. If reheated to 350 F. the plastic will return to its original shape. This quality has caused plexiglass to be described as having dimensional "memory."

The plastic bar should be a little shorter and it need be no heavier than the bone which it is holding. On cross section, it is a square with a slot in it just wide enough to accommodate the thickness of the steel pins it is to hold and deep enough to get a good grip on the pin, or about three quarters the thickness of the bar.

Applying the Splint.—In the application of any external fixation splint, the first step—the location and placement of the pins—is the hardest. The problem is one of leverage and the application of the splint should not commence until the leverage aspects are fully planned.

By traction and manipulation of the seg-

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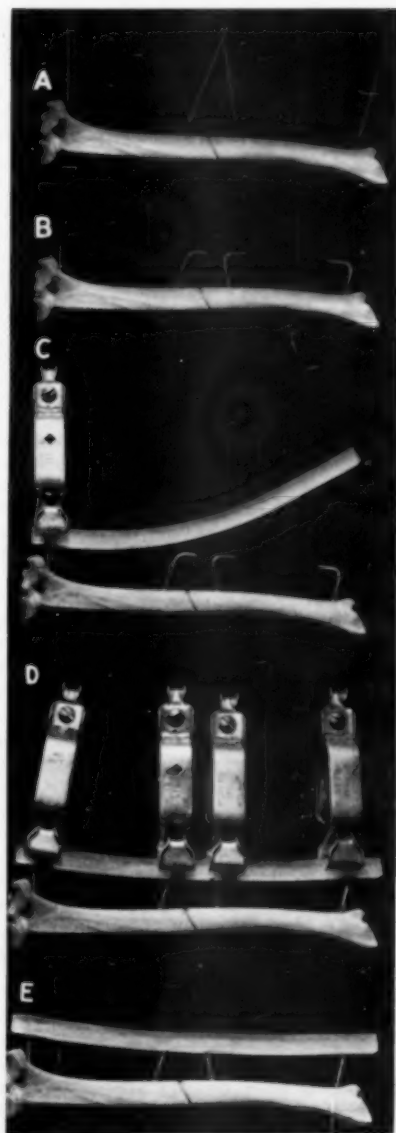


Fig. 1(A)—Placement of fixation pins.

(B) Pins cut proper length and bent over.

(C) Slotted plexiglass bar heated and mounted on bent-over pin with first battery clamp in position.

(D) Plastic bar completely mounted; the heated plastic is molded to the pin tops by pressure of battery clamps. At this stage the bar is cooled.

(E) Completed splint.

ments of the fractured bone, the normal anatomical relations are achieved and held by whatever means may be applicable. This will vary with the location and type of fracture. The pins are drilled into the bone, usually making sure the bone is completely transfixed. The pins are then cut to the required length, keeping in mind that the closer to the bone the bar is, the stronger the splint, and allowing for the depth of the slot and the length of pin to be bent over. In laying out the pins, no provision need be made for keeping the bar straight. A straight bar may look neater but a bar following the contour of the surface of the member will probably be stronger.

After each pin is cut, the end is bent over to give the bar a better grip on the pin. This bending operation, with strong hands and good pliers, is neither difficult nor time consuming. With a minimum of care, no stress is put on the bone. The bent parts should be in line so they can lie approximately in the bottom of the slot in the plastic bar.

Heating and Applying the Bar.—The problem is to bring the temperature of the plastic bar to about 350 F. The oven in an ordinary kitchen range works well. The bar is laid on one of the racks and, if the oven is preheated, the bars should be ready to work within about five minutes. A hot plate can also be used. The bar is suspended over the element with wire and watched for softening. Bubbles will form in the plastic if the bar gets too hot. This does not materially affect the value of the bar provided it is not extremely overheated. Cotton gloves must be worn while handling the plexiglass bar at 350 F.

The hot plastic bar, now quite flexible, is removed from its source of heat and is placed in position as follows. The slot in the bar, near its end, is placed over the first pin top and a battery clamp is applied to compress the plastic around the pin top. The slot is then quickly applied over the remaining pin tops and clamps quickly applied. The plastic bar is cooled with antiseptic solution applied with sponge or cotton. In about one minute, the clamps may be removed—the splint is completed. To protect the patient from a minor burn from the hot bar, it is well to place a layer of wet gauze on the skin. The amount of heat transmitted to the patient through the steel pin is trifling and has never caused trouble.

Strength of Splint.—This splint has passed all reasonable tests for strength. The plastic bar for a femur of a German Shepherd should be $\frac{1}{2}$ inch square on cross section with stainless steel pins 0.093 inch diameter. This pin would bend before the bar would break or before the bar would release the pin. Such a stress would probably result in the pulling of the pins from the bones or possibly in splitting the bone. In the treatment of eight tibial fractures in dogs and cats, the splint has never failed because of inadequate strength. It failed in two tibial fractures in dogs because of improper placement of the pins in the bone. A 5-year-old Siamese cat had splints on both fractured tibias and, in eight days, stood on its hindlegs to reach for food, without disturbing the splints or the fractures.

CONCLUSIONS

The disadvantages of this splint are: (1) it requires a source of heat to soften the plastic bar; (2) it has all the disadvantages inherent in external fixation splints; (3) it requires speed in applying the bar to the pins before the bar cools and loses its flexibility; and (4) once the splint is in place, the fracture segments can not be manipulated and, as with a cast, if not placed right, it must be reapplied.

The advantages are: (1) the low cost; (2) it is lighter than an all-metal splint; (3) it has no multiplicity of projections to snag on kennel wire; (4) no special tools are required except pliers and a pin cutter; and (5) it gives a neat appearance.

This splint is not expected to replace medullary pinning which is the treatment of choice in most fractures. Neither does this splint overcome any of the inherent disadvantages of external fixation splints except cost, disposability, and snag-proofness.

Effect of Testosterone on Ewes

When testosterone, 100 mg. per week, was injected intramuscularly in adult ewes, it did not increase the rate of gain or alter the carcass grade, but it did change the normal female behavior to that of a typical male, enlarged the clitoris, and reduced the size of the heart and thyroid glands. The weight of the ovaries and of the adrenal and pituitary glands was not affected. No active residual testosterone was found in the meat.—*J. Anim. Sci., Feb., 1956.*

Preliminary Studies on the Anthelmintic Properties of Piperazine Citrate in Dogs

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PIPERAZINE compounds have been recognized as possessing anthelmintic properties since 1947 when Hewitt *et al.*¹ employed diethyl-carbamyl-methyl-piperazine as an antifilarial drug in man. Various piperazine salts have recently been utilized for treating ascariasis in man and animals.²⁻⁷

The relatively nontoxic characteristics of piperazine have led to investigations of its value as an anthelmintic in dogs. This report deals with a trial which employed 25 dogs treated with piperazine citrate on various dosage schedules.

MATERIALS AND METHODS

Experimental dogs were selected at random from groups of animals secured at city pounds. During the experiment, the subjects were maintained in separate cages and the care and feeding was identical to that provided hospitalized animals.

Fecal samples were obtained from each animal for at least five consecutive days and examined for

helminth ova, using the sodium nitrate-flotation technique. Special attention was given the presence of ascarids, hookworms, and whipworms.

After establishing the approximate parasite load of each subject, body weights were recorded and the desired drug dosages calculated. The drug solution used contained piperazine citrate equivalent to 400 mg. of piperazine hexahydrate per milliliter and was administered in gelatin capsules.

During the treatment procedure and for at least three subsequent days, the feces were examined daily. Ultimately, each experimental animal was destroyed and, at necropsy, the intestinal tract and its contents were examined for the presence of adult worms.

RESULTS

Of the 5 dogs in group A, 4 were infected with hookworms and 3 with ascarids and whipworms. After treatment, 3 of 4 animals (75.0%) were negative for hookworm and all 3 dogs which had shown ascarid infection were negative both for ova and

TABLE 1—Effect of Piperazine Citrate on Helminths in the Dog

Experiment	No. of infected dogs treated	Piperazine citrate treatment (oral)	No. of dogs with ova in feces after treatment	No. of dogs free of worms at necropsy
1) Hookworms				
Group A	4	80 mg./lb. body weight on first day and then daily for 10 consecutive days beginning 5 days later.	1	1
Group B	3	160 mg./lb. body weight (single dose).	2	2
Group C	10	80 mg./lb. body weight (single dose).	7	5
Total	17		10	8
2) Ascarids				
Group A	3	80 mg./lb. body weight on first day and then daily for 10 consecutive days beginning 5 days later.	0	3
Group B	1	160 mg./lb. body weight (single dose).	0	1
Group C	7	80 mg./lb. body weight (single dose).	0	7
Total	11		0	11
3) Whipworms				
Group A	3	80 mg./lb. body weight on first day and then daily for 10 consecutive days beginning 5 days later.	3	2
Group B	1	160 mg./lb. body weight (single dose).	1	1
Group C	7	80 mg./lb. body weight (single dose).	5	4
Total	11		9	7

From the Department of Veterinary Pathology and Hygiene, College of Veterinary Medicine, University of Illinois (Bradley); and the Department of Veterinary Pathology and Parasitology, School of Veterinary Medicine, University of Georgia, Athens (Crimmins and Zwigart). These studies were completed while the senior author was associated with the School of Veterinary Medicine, University of Georgia, Athens.

E. R. Squibb and Sons, New York, N. Y., supplied the piperazine compound.

for parasites at necropsy. Fecal examinations for whipworm ova in this group were positive after treatment, but 1 of 3 animals was negative for adult whipworms at necropsy. Numerous tapeworms (*Dipylidium caninum*) were found in 3 of the 4 dogs at necropsy.

Group B also consisted of 5 dogs: 3 with hookworms, 1 with ascarids, and 1 with whipworms. After treatment, 1 of the 3 (33.3%) was negative for hookworms, the dog with ascarids was negative, but the 1 with whipworms showed no reduction in ova and had adult whipworms at necropsy.

Group C consisted of 15 dogs: 10 infected with hookworms, 7 with ascarids, and 7 with whipworms. After treatment, 3 of the 10 (33.0%) no longer showed hookworm ova in their feces and 5 of the 10 (50.0%) had no adult hookworms at necropsy. All 7 animals with ascarids had negative fecal samples with no ascarids found at necropsy. Of the 7 with whipworms, 3 (42.8%) were negative for adult worms at necropsy. The tapeworm, *D. caninum*, was found in 7 dogs of group C at necropsy (table 1).

DISCUSSION

The data indicate that piperazine citrate, given orally, has a high degree of anthelmintic efficiency against ascarids, more varied effectiveness against hookworms, and little or no effect against whipworms and tapeworms.

This therapy is probably more effective against ascarids since these parasites live in the intestinal lumen and come in direct contact with the drug when it is administered *per os*. On the other hand, since hookworms are attached to the intestinal mucosa and derive nourishment by the ingestion of blood and tissue fluids, not directly from the intestinal contents, they are less affected.

Whipworms which are found attached to the wall of the large intestine, chiefly the cecum, are little affected since the drug probably does not enter the cecum.

Perhaps the piperazine compounds should be tested for anthelmintic activity in dogs when administered by the parenteral route, especially against helminths (filaria) which normally inhabit the circulatory system.

These data also suggest that the continuous administration of piperazine salts in the animal's ration, such as is done with phenothiazine for large animals, might be attempted with dogs. Obviously, a low-level feeding program of piperazine or other such compounds to dogs presents the danger of indiscriminate use without the benefit of diagnosis.

SUMMARY

1) Results of oral dosage of 25 dogs with various levels of piperazine citrate are reported.

2) After ten consecutive daily doses at 80 mg. per pound of body weight, 3 of 4 (75.0%) infected dogs were free of hookworms, 3 of 3 (100%) infected dogs were cleared of ascarids, and 3 dogs with whipworm infections showed no reduction in ova, although 1 was free of adults at necropsy.

3) After a single dose of 160 mg. per pound of body weight, 1 of 3 dogs (33.3%) with hookworm infections had negative fecal and necropsy findings, 1 infected dog was rid of ascarids, and 1 dog with whipworm infection was unaffected.

4) When the drug was given to 15 dogs at a rate of 80 mg. per pound of body weight for one dose, 3 of 10 (30.0%) with hookworm infections were negative for ova and 5 of the 10 (50.0%) negative for adults at necropsy, 7 of the 7 (100%) infected dogs were negative for ascarids and, of the 7 animals with whipworms, 2 (28.5%) were negative for ova, while 3 (42.8%) were negative for adults at necropsy.

5) It is suggested that attention be directed to explore both parenteral injection and low-level feeding as possible routes of administration for this drug.

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An Epizootic of Ringworm Among Guinea Pigs Caused by *Trichophyton Mentagrophytes*

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DURING THE SPRING of 1954, an epizootic of ringworm occurred among guinea pigs in a laboratory in Georgia which was testing various lots of BCG vaccine. The guinea pigs, English short-haired type, were obtained at approximately 3 weeks of age from a local breeder. On arrival at the laboratory, the guinea pigs were caged in groups of 9. The experimental procedure involved frequent handling of the animals.

Prior to the epizootic, there was no unusual number of skin lesions in the 3,500 animals in six study groups received between Sept. 10, 1952, and Sept. 30, 1953.

The epizootic involved the seventh study group (1,188 animals received Nov. 15, 1953); the eighth group (1,197 animals received Feb. 15, 1954); and a ninth group (1,224 animals received March 22, 1954). All were obtained from the same local breeder. Animals in the groups 7 and 8 were kept in the same animal house. Group 7 was divided into two subgroups, 7-A and 7-B, composed of 688 and 500 animals, respectively. Skin lesions first appeared in subgroup 7-B and later in group 8. In March, 1954, all of these animals were surveyed and lesions were observed in 57

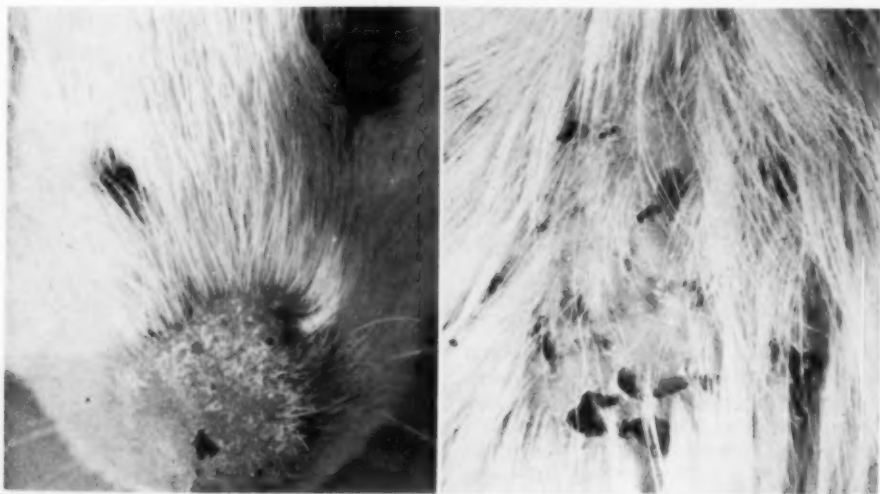


Fig. 1 (Left)—A lesion on the nose of a guinea pig showing erythema, scaling, and loss of hair.

Fig. 2 (Right)—A lesion on the back of a guinea pig showing scarring, scabs, and loss of hair.

One animal received May 25, 1953, was observed to have a skin lesion about two weeks later. Since ringworm was not suspected, none of the early groups had been thoroughly examined.

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Appreciation is expressed to personnel of the BCG Laboratory, Division of Special Health Services, Public Health Service, Chamblee, Ga., for their aid in obtaining data for this report.

(11.4%) of the animals in subgroup 7-B, and in 130 (10.8%) in group 8. Hair specimens were obtained from the lesions of 20 of the animals in subgroup 7-B and were cultured on cycloheximide medium.¹ *Trichophyton mentagrophytes* was isolated from 13 of the 20.

The skin lesions appeared to have started on the tip of the nose of the guinea pigs (fig. 1) and then spread to areas above or

below the eyes, the forehead, and the ears. Later, lesions developed over the posterior portion of the back. Only a few animals developed skin lesions on the legs. The lesions were scaly, circular, and there was erythema and loss of hair. Some of the lesions on the back had scabs and appeared to be causing scars (fig. 2).

Hairs from several infected animals were examined by the direct microscopic method in 10 per cent potassium hydroxide and chains of spores lying on the surface of the hairs were observed (fig. 3).

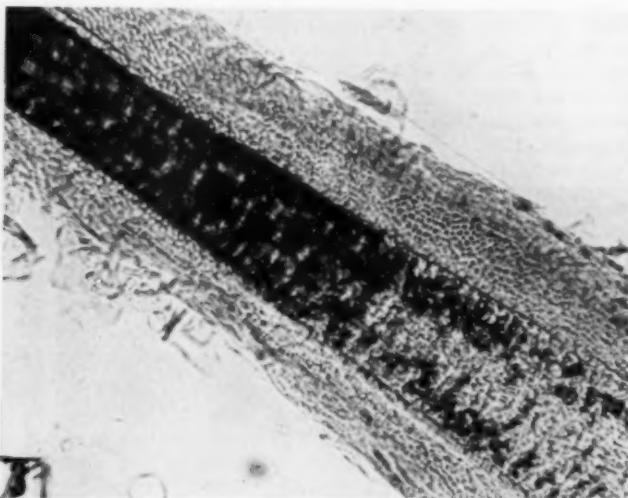


Fig. 3—An infected guinea pig hair showing spores.
x 220.

In April, 1954, hair specimens from 130 animals with skin lesions in group 8 were cultured on cycloheximide medium,¹ and *T. mentagrophytes* was isolated from 116 (89%). The colonies were of the white granular variety with a central, light tan area (fig. 4). Microscopic examination of the colonies showed the microconidia and macroconidia to be typical of *T. mentagrophytes* (fig. 5).

In order to determine how the infection was being introduced, animals from group 9 were cultured the day they arrived from the local breeder and 3 were found to have skin lesions. A hair specimen from 1 was cultured and *T. mentagrophytes* was isolated. This indicated that infection had occurred at the local breeder's establishment.

At the breeder's farm it was found that guinea pigs were kept in two rows of wood

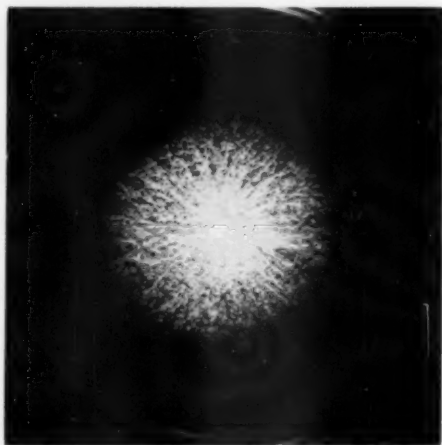


Fig. 4—A colony of the granular variety of *Trichophyton mentagrophytes* on Sabouraud's dextrose agar.

frame cages situated in an open field. A total of 900 breeding and 500 young animals were examined, and 2 adult guinea pigs were found to have skin lesions on the head. Due to lack of cooperation, no cultural studies could be carried out on these animals. It was concluded that the disease was being introduced to the laboratory by a few infected animals and that the constant handling of the animals in the laboratory probably aided the spread of the disease.

The epizootic of ringworm and other dis-

eases so disrupted the experimental procedures that it was decided to destroy all of the animals and clean and disinfect the laboratory. Some of the guinea pigs with lesions were saved for treatment studies which will be reported in another paper.

An attempt to obtain noninfected guinea pigs revealed that breeding establishments located in Pennsylvania and Maryland also had animals infected with *T. mentagrophytes*.

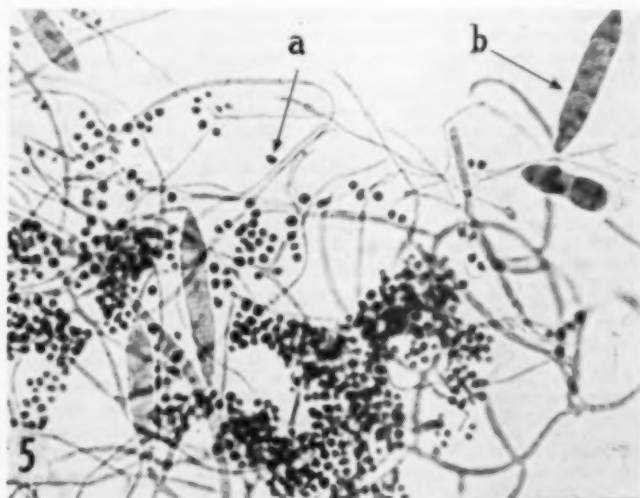
Although 21 of the 22 people who worked in the laboratory actually handled the

In a survey of ringworm in wild animals which is being conducted by the Newton Field Station and the Mycology Unit of the Communicable Disease Center, the infection has been found in wild mice and rats. The disease imposes a problem to the breeders of chinchillas⁷ and foxes.⁸

This fungus is also a common cause of ringworm epizootics in horses and occasionally affects cattle and dogs.⁹

In the guinea pig epizootic in Georgia, *T. mentagrophytes* was occasionally isolated from animals without visible lesions.

Fig. 5—Microconidia (a) and macroconidia (b) of *Trichophyton mentagrophytes*. x 522.



guinea pigs, none developed ringworm infections.

DISCUSSION

Naturally occurring cases of ringworm among guinea pigs caused by *T. mentagrophytes* have been described by Negroni,² and Fuentes *et al.*^{3,4} Negroni isolated the fungus from 2 guinea pigs in Argentina that had developed crusty lesions around their eyes and ears; Fuentes, from apparently healthy guinea pigs in a number of breeding colonies maintained by various laboratories in Cuba.

Trichophyton mentagrophytes ringworm has also been reported among other rodents. Epizootics were described among laboratory mice by Parrish and Craddock⁵ with 50 per cent of 2,500 mice being infected, and in wild muskrats by Errington.⁶

It was also observed that the lesions frequently underwent spontaneous healing.

The fact that animals may carry infective fungus elements on their skin and fur after the healing of lesions suggests the importance of culturing new stock and of holding newly acquired animals in quarantine before adding them to the regular stock.

Both wild and domesticated animals infected by *T. mentagrophytes* may be potential sources of infection to man. Infections of the exposed parts of the human body, caused by *T. mentagrophytes*, have occurred sporadically in rural areas.¹⁰

SUMMARY

A ringworm epizootic occurred among several thousand guinea pigs in a labo-

ratory in Georgia. *Trichophyton mentagrophytes* was isolated from 130 of the 151 animals cultured. The lesions, which occurred chiefly on the head, but also on the back, were scaly, circular, and there was erythema and loss of hair. Some lesions healed spontaneously. The disease was introduced to the laboratory by a few infected animals and constant handling probably aided in the spread.

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Optimum Temperatures for Animals

Dairy cows react quickly to heat, their feed consumption and milk production declining above 75 or 80 F., and practically stopping at 105. Production does not decline in Jerseys until temperatures drop to about 25, and in Holstein-Friesians until 5 F. Beef cattle, when cooled by a fan, gained 1 lb. more per head per day during a three-month period when temperatures often were 100 F.; cooling the drinking water to 65 F. also was beneficial.

Shoats weighing 100 lb. required the least feed for the next 100 lb. of gain when kept at 70 F., whereas hogs around 200 lb. gained best at 60 F. Hens lay well at 40 to 70 F. but best at 55 with a humidity

of 70 per cent, but they show distress, with egg production practically stopping at 95 F.—*U.S.D.A. Release, March 14, 1956.*

Rabies

A woman died of rabies, in Alabama, in January, 1956, eight months after having been bitten on her thumb by a stray dog. Negri bodies were found in her brain.

In Arkansas, a cat which had bitten two children later died and Negri bodies were found upon animal inoculation. One of the children was sensitive to horse serum. The outcome of treatment is not yet available. —*Pub. Health Serv. Release, Feb. 11, 1956.*

More on Rabies Control in Alberta

A report on the rabies epizootic in Alberta in the three years prior to the summer of 1955(*JOURNAL*, Oct., 1954: 316) states that no human cases have occurred, that the front has been pushed back 400 miles, and that big game animals have increased markedly. Coyotes were the chief offenders in biting domestic animals. Coyotes and foxes attacked people, school busses, cars, and tractors, and there was a story of a wolf "tugging at a house door while the residents pulled on the inside."

Because of the reservoir of the disease in the unsettled territory to the north, complete eradication is difficult. During the first half of 1955, rabies occurred in 25 domestic animals and 22 wild predators.

In the three-year period, the known losses were: cattle, 106; hogs, 180; horses, 21; sheep, 29; dogs, 43; cats, 13; coyotes, 51; foxes, 26; lynx, 4; beaver, 2; and a bear, wolf, weasel, moose, and rabbit.

The predators destroyed by hunting, trapping, and poisoning totaled 127,056, including 55,499 foxes, 50,781 coyotes, 9,927 lynx, 5,271 wolves, 3,827 bears, 664 skunks, 69 cougar, and 18 fishers.—*Canad. J. Comp. Med.*, Jan., 1956.

Antifungous Agent Aids Virus Culture.

—The production of foot-and-mouth disease vaccine, which had been hampered by fungous contamination of cattle tongue epithelial cells used for culturing virus, has been aided by mycostatin, an antifungous antibiotic. It is also effective against moniliasis in man.—*Squibb Release, Feb. 14, 1956.*

The Effect of Revaccination of Horses and Cattle with *Leptospira Pomona* Bacterin

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IN RECENT YEARS, the economic importance of leptospirosis in livestock has been well established. The disease has been repeatedly diagnosed and confirmed serologically in both cattle and swine,^{2,4,5} and apparently is present in every geographic region of the United States.⁶ Other evidence has shown that *Leptospira pomona* infection may be responsible for the occurrence of recurrent iridocyclitis (periodic ophthalmia) in horses.^{6,9} The disease is known to cause serious economic losses in cattle and swine due to abortions, decreased milk production, and weight loss; but while a close correlation exists between the presence of leptospiral antibodies and periodic ophthalmia, some observers believe that leptospirosis is of little importance in the horse.³ However, as more information is collected, it may prove to be significant in this species also.

DEVELOPMENT OF BACTERIN

In searching for a means to control leptospirosis in animals, York and Bakei,¹⁰ in 1953, described the preparation of a *L. pomona* bacterin in embryonating eggs. This bacterin, when administered to calves and guinea pigs, protected against challenge doses of virulent *L. pomona* organisms given two to six weeks later.

In an attempt to produce an improved leptospirosis bacterin, Brown *et al.*,¹ in 1954, described the production of a bacterin on a modified Stuart's medium. The growth of *Leptospira* in this medium proved to be as satisfactory as that in embryonating eggs and, by a slight alteration of the culture medium, it was possible to increase the growth of *Leptospira* organisms from four to six times which, in turn, resulted in an increase in the antigenicity of the bacterin.

Present recommendations for the use of both types of bacterin suggest a single dose to immunize susceptible animals to the disease. However, due to the short time the bacterins have been in use and the ab-

sence of definite knowledge as to the duration of bacterin-induced immunity, little is known concerning the most efficacious use of these preparations. If future results should indicate that immunity to leptospirosis following vaccination is transitory, it may become necessary to revaccinate one or more times to insure more complete protection of susceptible animals. If such a procedure becomes necessary, the problem of sensitization of animals by the initial injection of the antigen may be of importance.

Stuart's medium, while basically an inorganic preparation, requires the addition of 10 per cent inactivated rabbit serum for maximum growth of *L. pomona* organisms. This amount of foreign protein, while small, theoretically could act as a sensitizing agent when injected into animals of another species. In order to determine the response of animals to a second dose of bacterin, it was decided to inoculate a group of horses and cattle, allow time for sensitivity to develop, and then reinoculate these animals, observing them for any evidence of local or systemic reaction.

TABLE 1—Local Tissue Reaction to Inoculation with *Leptospira Pomona* Bacterin on Aug. 24, 1955

Animal	8/25/55	8/26/55	8/27/55
CATTLE			
Bull	Swelling (2 by 2 in.)	Normal	Normal
Heifer	Swelling (2 by 2 in.)	Swelling (1 by 2 in.)	Normal
Heifer	No swelling	No swelling	No swelling
Bull	No swelling	No swelling	No swelling
Bull	No swelling	No swelling	No swelling
HORSES			
Gelding	Swelling (2 by 2 in.)	Swelling (1 by 2 in.)	Swelling (1 by 1 in.)
Mare	Swelling (4 by 12 in.)	Swelling (2 by 7 in.)	Swelling (1 by 1 in.)
Mare	Swelling (3 by 10 in.)	Swelling (2 by 5 in.)	Swelling (1 by 1 in.)
Gelding	Swelling (2 by 3 in.)	Swelling (1 by 2 in.)	Normal
Gelding	Swelling (2 by 2 in.)	Swelling (1 by 1 in.)	Swelling (1 by 1 in.)

From the Medical Division of Sharp and Dohme, division of Merck and Co., Inc., West Point, Pa.

OBSERVATION AFTER REVACCINATION

Accordingly, 5 yearling cattle and 5 horses, 5 years of age or over, were obtained from a local farm. Serum titers for leptospirosis on these animals were not determined previous to the experiment, since it was felt that previous immunity to leptospirosis would have no effect on the development of a protein sensitivity.

The animals were confined in a barn, each was given a subcutaneous injection of 5 cc. of the bacterin, and for the following three days the site of injection was examined for any evidence of local tissue reaction to the inoculation (table 1).

Examination of table 1 will show that there was a slight tissue reaction at the site of injection in 2 of the cattle, which had disappeared by the morning of the third day of observation. The reaction in the horses was more extensive; however, by the end of the third day, evidence of swelling was negligible; and at no time did the animals show evidence of pain or discomfort.

Thirty-four days later, the same 10 animals were confined and were given a second 5-cc. injection of the same type of bacterin. Following this, the animals were turned out into a paddock and were observed closely for any systemic reaction for one and one-half hours. Since Sherwood¹¹ reports the onset of shock in sensitized animals to occur in a matter of minutes after a second dose of antigen, this was thought to be sufficient time for signs to develop if the animals had been sensitized by the initial injection. The animals were observed for excess salivation, increased respiration, trembling, and signs of internal pain or distress. None occurred so at the end of an hour and a half the animals were returned to pasture. The following day they were entirely normal, and the owner reported no change in their behavior.

SUMMARY

From the preceding observations, the following assumptions can be made:

1) The initial subcutaneous injection of 5 cc. of *Leptospira pomona* bacterin, produced on Stuart's modified medium, caused local reactions in all of 5 horses and in 2 of 5 cattle; but none was severe and there were no systemic reactions.

2) No signs of a systemic reaction oc-

curred when the same 10 animals were again similarly vaccinated 34 days later.

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Cortisone and Chicken Blood Cells.—When ACTH or cortisone acetate were given daily to chicks 2 to 4 weeks old, both produced a relative lymphopenia, a relative and absolute eosinopenia, a relative and absolute rise in heterophils, but no change in absolute numbers of lymphocytes and erythrocytes.—*Poult. Sci., Nov., 1955.*

Chicken Age and Parasite Maturity.—A limited experiment indicates that *Ascaridia galli* can mature in about 30 days when the ova are fed to chickens less than 30 days old, whereas the parasites require 50 days to mature in chickens 90 days old when infected.—*J. Parasitol., June, 1955*

Questions by a Correspondent.—While the administration of antibiotics for minor disorders may increase the resistance of certain bacteria, may their benefits not outweigh the risks? Could their prompt use by practitioners be responsible for the reduced number of cases of mastoid infection, osteomyelitis, and other septic conditions which were much more common years ago?—*Brit. Med. J., Jan. 28, 1956.*

Blackleg of the Fetus in Ewes

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Pullman, Washington, and Helena, Montana

IN MARCH, 1955, *Clostridium jesi* infection in two bands of sheep was brought to the attention of the Montana Livestock Sanitary Board. Both outbreaks were unusual in that the primary lesions were found in the fetuses. We had neither observed this type of manifestation in pregnant ewes nor seen it described. Typical blackleg lesions in ewes following infection of shear wounds have been observed by us many times but ewes are usually sheared after lambing in the spring. In both of these instances, the ewes were sheared a short time prior to lambing, which is unusual in the northern states. Thus, blackleg in ewes in the latter stages of pregnancy has not been observed here.

The first case was reported to us by a rancher who was shearing 1,400 ewes about three weeks before lambing was due to start. On March 6, after about 400 ewes had been sheared and after there had been some death losses in the ewes, a ewe was presented for necropsy and a diagnosis of blackleg was made. There was evidence that the infection had entered through a shear wound. Typical blackleg lesions were found in the muscle areas. On March 9, all of the sheep were vaccinated, using a mixed *Clostridium chauvoei* and *Clostridium septicum* bacterin. Seven days following vaccination, the owner reported that the blackleg losses had been reduced, but there appeared to be another condition present. He reported that the ewes appeared bloated and he also stated that he was treating the sick animals with penicillin.

An investigation at the ranch revealed that 48 ewes had died in two weeks; 13 had shown typical signs of blackleg while the other 35 showed marked distention of the abdominal region. The animals treated with penicillin had lived for a week or so but eventually died. When not treated with penicillin, death usually occurred within 24 hours after symptoms were first observed. It was also reported that most of

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Fig. 1—Fetal lamb showing marked distention with gas and edema.

the ewes recovered without further complications when the cervix was dilated sufficiently to allow removal of the lambs.

Inspection of the affected ewes revealed typical blackleg lesions in the leg muscles of some, while others showed marked distention of the abdominal region, with weakness of the hindquarters and, in some cases, inability to rise. In most ewes, the appetite appeared to be good and the body temperature was normal.

One ewe with a distended abdomen and evidence of toxemia was destroyed and examined. She had been treated by the owner with penicillin. Her skin had been cut in shearing, but there was no evidence of swelling or discoloration in any of the muscles. The lungs showed some congestion, possibly due to the fact that the animal had been lying for some time. The heart, liver, and spleen appeared normal.

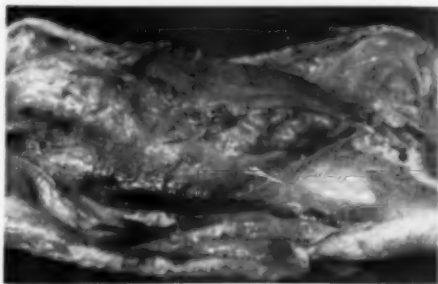


Fig. 2—The same fetus shown in figure 1, with skin partially removed.

The kidneys showed some congestion in the cortex. There were no pathological changes of the digestive tract and no evidence of excessive pericardial or peritoneal fluids. The enlarged abdomen was caused by extreme distention of the uterus. The wall of the uterus showed slight hyperemia and a slight endometritis. The twin fetuses were much enlarged by edema and gas in the tissues (fig. 1). When the lambs were opened (fig. 2), there was a strong odor characteristic of *Cl. fescer*. *Clostridium fescer* was recovered from cultures of fetal tissues and by guinea pig inoculations.

On March 19, 1955, an almost identical report came from another part of the state of a band of 2,600 ewes which were due to start lambing on March 30. Shearing had been finished on March 14. Two or three days after shearing started, about 12 ewes were showing lameness and swollen heads. Death losses started on March 12 and, a week later when the owner brought 6 sheep to the laboratory, 45 had died. The owner reported that some of the ewes which died had shown swellings of the skeletal muscles typical of blackleg and that others appeared bloated. Some had recovered after being treated with penicillin and sulfonamides. Necropsies of ewes at the ranch revealed no apparent lesions except in the fetuses. Again, *Cl. fescer* was recovered.

CONCLUSIONS

It is of interest that on both ranches the mode of operation had been changed in such a way that the ewes in the latter stages of gestation were exposed to the blackleg infection through shearing wounds. It would appear that fetal tissues may be more susceptible to invasion by *Cl. fescer* than are the tissues of the ewe. It is possible that the penicillin reduced or eliminated the infection from these ewes but did not pass the placental barrier to protect the fetuses. It is of interest that no new cases were reported more than two weeks after vaccination. It may be that a partial immunity developed, offering some protection to the maternal tissues without protecting the fetuses in any way.

SUMMARY

On two Montana ranches, blackleg infection occurred in many ewes soon after they were shorn while pregnant. When treated with penicillin, some affected ewes recovered; others developed a distended

abdomen before dying. *Clostridium fescer* was recovered from the edematous fetuses in these ewes.

[A similar condition was found, at necropsy, in a 4-month fetus in the uterus of a Hereford heifer on Dec. 22, 1932. The heifer had been ill only a few hours and had strained as if calving. Her peritoneal cavity contained a "dirty gray" exudate. Her uterus was in a normal position, but uniformly dark colored. The fetus was blackish, emphysematous, and had the butyric acid odor typical of blackleg. Unfortunately, a laboratory diagnosis was not secured.—Ed.]

Role of Anemia in Vaccination Shock.—When weaned pigs, in which anemia had been induced, were vaccinated simultaneously with modified live virus and anti-hog cholera serum, an anaphylactic-like shock was produced. However, shock did not follow the use of attenuated hog cholera vaccine or of anti-swine erysipelas serum.—*Vet. Bull.*, Sept., 1955.

Less Thoracoplasty in Tuberculosis.—Excision of all or part of a lung with tuberculosis lesions is now favored over thoracoplasty, a collapse measure, by about 90 per cent of experienced surgeons and internists.—*TB Med. News*, Feb., 1956.

Cattle Treated for Tuberculosis.—When 5 cattle with advanced tuberculosis in Italy were given 4 mg. of iso-nicotinic acid hydrazide per kilogram of body weight daily, they showed a marked improvement in general condition and eosinophilia, and an increased sensitivity to tuberculin.—*Vet. Bull.*, Oct., 1955.

A False Tuberculin Reaction

When a cow with actinobacillosis was tuberculin-tested, the intradermal reaction, on the neck, was highly suspicious but the "short thermal test" was negative. Three months later, when the *Actinobacillus* infection had been eliminated with penicillin and iodides, the intradermal tuberculin test was completely negative.

Two other cases are referred to in which tuberculin tests were positive but necropsy revealed only actinomycosis.—*J. South Afric. Vet. M. A.*, Dec., 1955.

What Is Your Diagnosis ?

Because of the interest in veterinary radiology, a case history and accompanying radiographs depicting a diagnostic problem are usually published in each issue of the JOURNAL.

Make your diagnosis from the picture below—then turn the page ►



Figure 1

History.—A Collie-type male dog of middle age was wounded on the right foreleg, 2 inches above the carpal joint, in a dog fight. The wound continued to discharge and, after five weeks, the dog was submitted for treatment. A radiograph was taken (fig. 1).

(Diagnosis and findings are reported on next page)

Here Is the Diagnosis

(Continued from preceding page)

Diagnosis.—At surgery, a portion of a canine tooth (arrow, fig. 2) was removed. The wound healed properly.



Figure 2

Our readers are invited to submit case histories, radiographs, and diagnoses of interesting cases which are suitable for publication.

This case was submitted by Dr. C. J. Starch, Des Moines, Iowa.

Observations on Ascaricides in Swine

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THE USE OF sodium fluoride for the removal of large roundworms (*Ascaris lumbricoides*) was described by Habermann *et al.*¹ in 1945. Foster *et al.*² reviewed the status of sodium fluoride treatment and summarized the data from seven groups of investigators. These combined data showed that the chemical had removed 2,264 of 2,369 ascarids (95%) from 308 pigs and 3,361 of 3,903 stomach worms (93%) from 43 pigs. At the provisional rate of 1 per cent in dry feed, the efficacy against ascarids was 93 per cent and against stomach worms 62 per cent. They concluded that sodium fluoride in dry, ground feed at a level of 1 per cent for one day is a safe, effective, simple, and economical treatment.

In 1948, Turk and Hale³ reported clinical observations on the use of sodium fluoride in swine. Rather than allowing pigs free access to feed containing sodium fluoride, they allowed only 1 lb. of medicated feed for each 25 lb. of body weight. If the animals weighed more than 25 lb., they were given a second pound 12 hours later. In no event was an animal given more than 4 lb. of medicated feed regardless of weight. This prevented any signs of toxicity and apparently was efficacious. In pigs weighing more than 25 lb., usually 48 hours or longer was required for the animal to consume the required amount of medicated feed. This procedure has been used routinely since May, 1948.

Guthrie⁴ reported the results of six critical tests involving 53 parasitized pigs in which cadmium anthranilate was found to exhibit marked ascaricidal activity. He suggested that a concentration of 0.066 per cent be given in the ration for three consecutive days for the most consistent results. In 12 pigs so treated, 287 of a total of 292 ascarids were eliminated for an efficacy of 98 per cent. Fourteen pigs received the same concentration for four days and

eliminated 244 of 263 ascarids for an efficacy of 92 per cent.

Burch and Blair⁵ reported on the use of cadmium oxide as an ascaricide in swine. Studies were made on toxicity, palatability and ascaricidal activities of the drug when mixed with dry feed and fed to swine. They concluded that the addition of 1 lb. of 1.5 per cent cadmium oxide to 100 lb. of dry feed (final concentration 0.015), and fed exclusively for 72 hours was a palatable, safe, and effective swine ascaricide.

Sodium fluoride has been routinely used as an ascaricide since 1948 in the swine maintained by the Department of Animal Husbandry at the Texas A. & M. College and the Texas Agricultural Experiment Station. Since the majority of these swine are purebred, the individual value of the animal precludes necropsy in most instances. Due to pasture rotation and good husbandry practices, parasitism has never been considered a major problem. However, swine ascarids are not completely controlled and animals are usually given an anthelmintic when brought in from the field and placed in pens for experimental purposes.

MATERIALS AND METHODS

With the advent of cadmium oxide and cadmium anthranilate,^{4,5} it was thought advisable to test the efficacy of these compounds against sodium fluoride. For the purposes of this test, animals were allowed free access to medicated feed for 48 hours. Since necropsy of the test animals could not be done, it was planned to compare the anthelmintic effects of the other drugs with that of sodium fluoride. The first lot of pigs was divided into two groups. Sodium fluoride was given to one group, cadmium oxide to the other. Unfortunately, no worms were passed by either group. It was then decided to divide the animals in other lots into two groups, one group to get sodium fluoride and the other group cadmium oxide, then approximately ten days later, reverse the treatments. It was assumed that worms not removed by the first treatment might be removed by the second. If no worms were recovered following the second treatment, it would be assumed that all would have been removed by the first treatment. Sodium fluoride was at a final concentration of 1.0 per cent. Cadmium oxide was at a final concentration of 0.015 per cent. The ration was the same in all tests.

Professor and head, Department of Veterinary Parasitology (Turk) and professor, Department of Animal Husbandry (Hale), A. & M. College of Texas and the Texas Agricultural Experiment Station, College Station.

Grateful acknowledgement is made to Mr. Otto Seaman, herdman, whose cooperation and assistance made these observations possible.

RESULTS

In the four lots (37 pigs) given cadmium oxide then re-treated with sodium fluoride (table 1), only 14 worms were removed by

TABLE 1—Results when Pigs were Treated with Cadmium Oxide then Re-Treated with Sodium Fluoride

Date	Lot	No. of pigs	Anthelmintic	Worms passed
7/1/54	2	10	Cadmium oxide	3
7/13/54			Sodium fluoride	15
7/1/54	3	10	Cadmium oxide	1
7/13/54			Sodium fluoride	19
7/5/55	5	5	Cadmium oxide	3
7/19/55			Sodium fluoride	1
8/17/55	8	12	Cadmium oxide	7
8/29/55			Sodium fluoride	0

cadmium oxide, yet when these animals were re-treated with sodium fluoride a total of 35 worms was passed. In only one group, lot 8, were no worms removed by sodium fluoride following cadmium oxide.

Two lots (17 pigs) received sodium fluoride first then were given cadmium oxide (table 2). They passed 20 ascarids following the first treatment, none following the second.

TABLE 2—Results when Pigs were Treated with Sodium Fluoride then Re-Treated with Cadmium Oxide

Date	Lot	No. of pigs	Anthelmintic	Worms passed
7/5/55	4	5	Sodium fluoride	4
7/19/55			Cadmium oxide	0
8/17/55	7	12	Sodium fluoride	16
8/29/55			Cadmium oxide	0

It must be assumed that under conditions of this test, cadmium oxide removed only 14 of a possible total of 49 worms (28.6%), since 35 were removed by subsequent treatment with sodium fluoride. On the reversal of medication (table 2), sodium fluoride removed 20 worms whereas cadmium oxide administered 12 to 14 days later did not remove any. It is logical to assume that either all worms were removed by the sodium fluoride, or that the worms possibly remaining were resistant to both chemicals.

Similar tests were set up, treating animals first with sodium fluoride then re-treating with cadmium anthranilate, or treating with cadmium oxide then re-treating with sodium fluoride. Cadmium anthranilate was in final concentration of 0.044 per cent as recommended on the con-

tainer for use of the product available commercially.

The 25 pigs which received cadmium anthranilate passed a total of 16 worms but when re-treated with sodium fluoride, they passed 21 worms (tables 3 and 4). If we assume sodium fluoride to be 100 per cent effective, which it probably is not, cadmium anthranilate removed only 16 of the possible 37 worms (43%) present. The

TABLE 3—Results when Pigs were Treated with Cadmium Anthranilate then Re-Treated with Sodium Fluoride

Date	Lot	No. of pigs	Anthelmintic	Worms passed
7/5/55	6	5	Cadmium anthranilate	0
7/19/55			Sodium fluoride	2
8/17/55	9	12	Cadmium anthranilate	15
8/29/55			Sodium fluoride	2
8/29/55	10	8	Cadmium anthranilate	1
9/14/55			Sodium fluoride	17

sequence of drug administration was then reversed on the next lot of 8 pigs. Sodium fluoride removed 15 worms; later, cadmium anthranilate removed none. As in table 2, it was assumed that either sodium fluoride removed all the worms or that the worms that remained were resistant to both chemicals. In all tests, all animals were observed three times daily and kept under observation for a minimum of ten days.

It is common knowledge that pigs dislike the taste of sodium fluoride. No aversion to either cadmium oxide or cadmium anthranilate was noted. In a few groups, weights were recorded at the beginning and end of the treatment. In lot 7, 12 animals were started on cadmium oxide. The medicated feed was removed 48 hours later. The total weight gain of the 12 pigs was 25 lb. for this 48-hour period. A total of 120 lb. of feed was given and 94 lb. of feed was consumed.

At the same time, the 12 pigs in lot 8 were given a total of 120 lb. of feed containing 1 per cent sodium fluoride. These animals consumed a total of 32 lb. of feed and lost 27 lb. There was, therefore, a difference of 52 lb. gain in the 48-hour period

TABLE 4—Results when Pigs were Treated with Sodium Fluoride then Re-Treated with Cadmium Anthranilate

Date	Lot	No. of pigs	Anthelmintic	Worms passed
8/29/55	11	8	Sodium fluoride	15
9/16/55			Cadmium anthranilate	0

TABLE 5—Weight Gains and Feed Consumption of Pigs 48 Hours on Feed Containing Anthelmintics

Date	Lot	No. of pigs	Anthelmintic	Feed consumed	Initial wt.	Term. wt.	Gain or loss (-)
8/29/55	7	12	Cadmium oxide	94	671	706	25
8/29/55	8	12	Sodium fluoride	32	668	641	-27
8/17/55	9	12	Cadmium anthranilate	72	631	631	0
8/29/55	10	8	Cadmium anthranilate	42	321	342	21
9/14/55	10	8	Sodium fluoride	45	467	465	-2
8/29/55	11	8	Sodium fluoride	22	345	339	-6
9/14/55	11	8	Cadmium anthranilate	50	478	488	10

between the two groups of pigs (lots 7 and 8).

Twelve pigs (lot 9) were given 90 lb. of feed containing 0.044 per cent of cadmium anthranilate. They consumed 72 lb. of feed and made no gain for the 48-hour period.

The 8 pigs in lot 10 consumed 42 lb. of feed containing cadmium anthranilate and gained 21 lb. The same pigs later placed on feed containing sodium fluoride consumed 45 lb. of feed, but lost 2 lb.

The 8 pigs in lot 11 were given 40 lb. of feed containing 1.0 per cent of sodium fluoride. They consumed 22 lb. of feed and lost 6 lb. The same pigs placed on 50 lb. of feed containing cadmium consumed 50 lb. of feed and gained 10 lb. There was, therefore, a difference of 17 lb. in favor of cadmium anthranilate.

Details of the weight gains showing initial weight, feed consumed, medication, and terminal weights are shown in table 5.

DISCUSSION

Sodium fluoride, under the conditions of this experiment, evidently was more efficient as an anthelmintic against the swine ascarid than was either cadmium oxide or cadmium anthranilate. However, the dislike of pigs for sodium fluoride, with a consequent lowered food intake, resulted in weight losses during the 48-hour treatment period. The animals apparently had no aversion to either of the cadmium compounds and in all but one instance gained weight during the test period. Whether the pigs would compensate for the initial loss of weight later due to elimination of ascarids could not be determined under the conditions of this experiment. Further tests are planned to determine the effect of various treatments on subsequent daily gains and feed required per pound of gain over a longer period.

SUMMARY

A reversal type of anthelmintic testing

was utilized in pigs which could not be subjected to necropsy.

Sodium fluoride removed more adult ascarids than did either cadmium oxide or cadmium anthranilate. However, weight losses during the treatment period were greater with sodium fluoride.

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Leptospirosis in a Boy

A boy, 4 years old, in Pennsylvania, had pharyngitis one day, then a temperature of 105 F. and convulsions the next day and was partially comatose for a week. All serological tests were negative on the third and fifth days, but on the twentieth and thirty-fifth days they were positive at 1:100 to 1:400 for three of the *Leptospira pyrogenes* group (*Leptospira newman*, *Leptospira australis* B, and *L. pyrogenes*), which heretofore have been reported only from southeastern Asia.—*Pub. Health Service Release*, Feb. 18, 1956.

Death After Fumigation.—Following the fumigation with hydrogen cyanide of household goods, including a baby carriage, the baby died and others became ill. A budgerigar also died and cyanide was found in the lungs of both the child and the bird. It was believed that the mattress in the carriage retained some hydrogen cyanide which had subsequently been released.—*J.A.M.A.*, June 25, 1955.

Experimental Leptospirosis. II. The Role of Calves in the Transmission of *Leptospira Pomona* Among Cattle, Swine, Sheep, and Goats

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LEPTOSPIROSIS (*Leptospira pomona* infection) has become recognized during the past ten years as a threat to the livestock population of this country. The epizootiology has been defined but requires further elucidation. Cattle may be renal carriers of leptospires for periods of three months.¹⁰ *Leptospira pomona* infections can be transmitted experimentally from infected calves to susceptible calves.¹ Burnstein and Baker³ showed that infection may be transmitted from diseased pigs to other pigs and calves but they were unable to show the reverse, that leptospirosis can be transmitted to pigs by contact with *L. pomona*-infected calves. The role of the infected calf in transmission of leptospirosis to other cattle, pigs, sheep, and goats has not been thoroughly delineated. This work was undertaken to further the epizootiological knowledge and to make possible a study of the course of *L. pomona* infection in several domestic animal species.

MATERIALS AND METHODS

The strain of *L. pomona* selected for exposure was originally isolated from bovine urine obtained during active infection in a Wisconsin dairy herd.⁷ It had been maintained since isolation by continual passage through guinea pigs and had been designated as strain Wickard.⁸

Six calves, 4 pregnant heifers, 4 weanling pigs, 4 sheep, and 2 goats which were negative to the serum agglutination-lysis test⁹ at the initiation of the experiment served as experimental animals. The calves, which were from 1 week to 4 months of age, were infected with *L. pomona* by subcutaneous injection. They then served as carriers to

which the other animals were exposed. The pregnant, grade Holstein-Friesian heifers were in the fifth to seventh month of gestation at the time of contact exposure. The pigs, which were approximately 8 weeks old, were held in isolation for five days before being placed in isolation units with the infected calves. The sheep, which were 3 and 4 years old, were procured from a flock which had no clinical history to indicate the presence of leptospirosis. Two, 4-month-old goats were obtained; they had been confined in a small pen since birth.

The animals were kept in four pens of a modern isolation unit in which principles of strict isolation were exercised and in a cattle shed where contact with other livestock was impossible and where human and vehicular traffic to the premises was restricted to authorized personnel. This reduced the potential of accidental infection to a minimum. The isolation pens provided 70 sq. ft. of floor space and were cleaned daily with warm (180.0 F.) water under pressure. The shed unit was 16 ft. by 20 ft. with approximately one half of the floor area paved with concrete and the remainder being a dirt floor. No drainage was provided. This unit was not cleaned during the course of the experiment.

The animals in the isolation pens were provided with a mixed ground grain ration with dried beet pulp incorporated as bulk for the ruminants. No litter was provided. The grain ration was fed in metal baskets or metal troughs, and the water was provided in suitable garbage cans. The uneaten hay provided litter for the animals in the shed unit.

The animals were initially dispersed (table 1) in the various units as follows: Each of three isolation pens was stocked with 1 infected calf, 1 heifer, and 1 pig; the fourth isolation unit contained 1 infected calf and 1 heifer; and the shed unit contained 2 infected calves, 1 pig, 4 sheep, and 2 goats. At the termination of the experiments involving 14 of the animals, the 6 remaining animals were placed in two pens of the isolation unit. The first pen contained 2 infected calves and 2 goats, while the second contained 1 infected calf and 1 ewe. The two groups were maintained for an additional 14 days and the experiment was then concluded.

The 6 calves were inoculated subcutaneously with 5.0 cc. of heparinized blood obtained from infected guinea pigs. This blood was obtained when the maximal pyretic response (105.0 to 106.0 F.) was manifested.⁹ The normal animals were placed in contact with the infected calves seven days following inoculation. Rectal temperatures were taken

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TABLE 1—Distribution of Experimental Animals for Transmission of Leptospirosis

Initial distribution†					Shed	Secondary distribution‡		
Animals	Isolation unit (pen No.)					Animals	Isolation unit (pen No.)	
	1	2	3	4		1	2	
Calves*	1	1	1	1	2	Calves*	2	1
Heifers	1	1	1	1	..	Heifers	..	..
Swine	1	1	1	..	1	Swine	..	..
Sheep	..	..	..	..	4	Sheep	..	1
Goats	..	..	..	..	2	Goats	2	..

* All calves experimentally infected and used as sources of infection for other animals.

† Exposure for 30 hours to 34 days.

‡ Exposure for an additional 14 days.

daily and the animals were observed for clinical signs of leptospirosis. Whenever a temperature rise, anorexia, polypnea, depression, or lethargy were manifested by any of the animals, blood samples were secured on that day and on two successive days. A minimum of five tubes of modified Chang's fluid medium^{4,7} were inoculated with approximately 0.05 cc. of the blood. Cultures were placed in an incubator at 28 C. and held for a maximum of 30 days. All tubes were examined at approximately weekly intervals by dark field microscopy for evidence of leptospiras. Tubes of the medium which proved to be contaminated were discarded. Serum was collected from the animals at three- to five-day intervals following the observation of symptoms and at weekly intervals thereafter until destroyed. The agglutination-lysis test was employed throughout for serological examinations.⁸

Approximately 3.0 cc. of urine, milk, and 10.0 per cent tissue emulsion of kidney in 0.85 per cent sodium chloride solution were inoculated intraperitoneally into each of 3 to 5 guinea pigs and each of 5 hamsters. Lactation resulted from 1 of the heifers from the nursing efforts of the infected calf. Chorionic or amniotic fluids, stomach contents, and saline emulsions of fetal bovine kidney, liver, and spleen were also inoculated into guinea pigs. Guinea pigs and hamsters were held for 18 to 30 days prior to exsanguination. Their serums were examined by the agglutination-lysis test.⁸ Titers of 1:100 or higher were considered to be indicative of infection and proof of the presence of *L. pomona* in the original inoculum.

Animals were destroyed at various intervals during the course of the experiment to obtain gross pathological, serological, and bacteriological data.

EXPERIMENTAL RESULTS

1) *Experimentally Infected Carrier Calves.*—Rectal temperatures of the experimentally infected calves, taken daily, showed a febrile reaction with maximal temperatures of 103.8 to 106.5 F. at three to seven days postinoculation. Other symptoms observed for periods of two to three days were lethargy, constipation, mild catarrhal to purulent rhinitis, excessive lacrimation, polypnea, a slight nonproductive cough, and excessive micturition. Hemoglobinuria was manifested by all 3 Here-

ford calves but not by the 3 infected Holstein-Friesian calves. Hereford calf 67 died of acute leptospirosis eight days after inoculation; gross lesions were not found on necropsy. Hereford calf 69 had extreme hemoglobinuria on postinoculation days 12 to 15 and died on the twenty-fifth day; the course of the infection was complicated by a persistent diarrhea. Leptospiras were isolated from blood which was collected during pyrexia. Leptospiemia was proved for all 6 calves and 4 of them were found, by means of the guinea pig inoculation technique, to be shedding leptospiras in their urine. Calf 67, which died during acute leptospirosis, and calf 68 were never proved to be renal shedders.

Serum agglutination-lysis titers were first detected on six to 15 days after inoculation. When the 4 surviving calves were destroyed for necropsy, at 44 days postinoculation, their titers were 1:10,000,000 and leptospiras were not isolated from their kidneys or urine. Their kidneys contained numerous gray-white foci over the entire cortical surface. These foci extended several centimeters into the cortex and, in some instances, into the medulla. There was considerable resistance to the knife blade, indicating extensive fibrosis, when longitudinal slices were made of the kidneys (fig. 1). The livers of 2 calves were firm and mottled. Accumulation of peritoneal and pericardial fluids was observed in some of the calves. Calf 71 was extremely emaciated and unthrifty.

The clinical features and bacteriological findings for the 6 calves are shown in table 2.

2) *Animals Infected by Contact Transmission.*—Heifer 46 had a temperature of 104.0 F. six days after 30 hours of contact with calf 67 before the calf died. Pyrexia was followed by slight constipation. Other clinical signs were not observed. The heifer was slaughtered 33 days postexposure. On necropsy, the chief lesions were pronounced

gray-white foci of both kidneys; the other organs appeared to be normal. A living 4½-month-old fetus was present in the uterus. The chorionic, allantoic, and amniotic fluids were straw colored, and the capsules of both kidneys were extremely edematous. Attempts to isolate leptospires from the maternal blood, urine, or kidneys, as well as from the fetal organs, were not successful. The terminal serum agglutination-lysis titer of heifer 46 was 1:1,000,000.

Heifer 73 was in contact with infected calf 70 for 19 days. A primary temperature rise to 104.0 F. occurred seven days following exposure and a serum titer of 1:10 appeared on the fifteenth day postexposure and, on the nineteenth day, she had a temperature of 104.4 F. and leptospires were isolated from her blood and milk. On the twenty-fifth day following exposure, when she was destroyed, her temperature was 105.0 F., her respiratory rate 103 per minute, and she had a cloudy vaginal discharge. Agglutinins were demonstrable in a serum dilution of 1:10,000,000. Her 5-month-old fetus was alive, had strong heart action, but made no respiratory attempts. Amniotic fluids and fetal stomach contents were viscid, turbid, and yellow. The fetal viscera and mesenteries were slightly edematous. The cortices of the maternal kidneys contained discrete, grayish foci. All guinea pigs which were inoculated with

fetal kidney and spleen material died 24 to 72 hours later. Leptospires were not isolated from any of the fetal organs or fluids but were isolated from the maternal kidneys.

Heifer 76 showed clinical signs of leptospirosis during the twenty-fourth day of exposure to infected calf 72. Her temperature was 103.2 F. and her titer was 1:100,000; a titer of 1:10 had first appeared on the fifteenth day postexposure. At 27 days postexposure, when her temperature was 103.4 F. and her respirations 104 per minute, she was destroyed for necropsy. Her kidneys were friable and mottled with grayish white foci which extended deep into the cortex and medulla and there were numerous petechial hemorrhages in the renal cortex. The liver was firm in consistency and distinctly mottled. The gallbladder was slightly edematous. The fetus was alive but, on necropsy, showed edema of the kidney capsule, pericardium, and mesentery. Leptospires were not demonstrable in the maternal kidneys or liver nor in the fetal kidneys, spleen, amniotic fluids, or stomach contents.

Heifer 84, which had been in contact with infected calf 68 which was not proved to be shedding leptospires in the urine, developed no signs of leptospirosis except a temperature of 103.6 F. on the third day postexposure. Significant serum agglutina-



Fig. 1—Kidneys and renal lymph nodes of calf 71. Extensive cortical and medullary lesions can be observed, indicating chronic type of *Leptospira pomona* infection.

TABLE 2—Evidence of Leptospirosis Observed Among Experimentally Infected Calves*

Animal	Breed	Postexposure day	Clinical signs		Bacteriological results†		
			Temp. (F.)	Hemoglobinuria	Blood‡	Urine‡	Kidney
67	Hereford	6	103.8	+	+	(6-7)	—
68	Holstein-Friesian	3	104.2	—	+	(3)	—
69	Hereford	6	105.0	+	+	(4-7)	+(10-20)
70	Holstein-Friesian	5	106.5	—	+	(6-7)	+(16-26)
71	Holstein-Friesian	7	105.8	—	+	(5-7)	+(10-28)
72	Hereford	5	104.8	+	+	(5-10)	+(12-28)

* Subcutaneous exposure to *Leptospira pomona*, strain Wickard. These calves were used as infected animals for transmission experiments.

† Blood cultured directly in Chang's medium. Urine or kidney homogenates inoculated via intraperitoneal route in guinea pigs; development of serum-agglutininins indicated presence of *Leptospira* organisms in inoculum.

‡ Numbers indicate the days or period postexposure on which leptospires were demonstrable.

tion-lysis titers failed to develop. She was destroyed for necropsy at 33 days post-exposure. Her kidneys contained a few scattered, grayish foci which extended only a few millimeters into the cortex. Serums of guinea pigs and hamsters, which were inoculated with maternal kidney or fetal kidney, liver, spleen, amniotic fluid, or stomach contents, failed to give positive agglutination-lysis titers.

All 4 pigs developed leptospirosis following contact with the experimentally infected calves. Thermal responses were evidenced from the eighth to the eighteenth days postexposure, with peak temperature rises of 104.6 to 106.5 F. One pig appeared lethargic and developed a diarrhea concurrent with the pyrexia. The other 3 pigs remained asymptomatic except for the febrile responses. Leptospires were isolated from the blood of 2 pigs. Serum agglutinin titers of $1:10^6$ to $1:10^8$ were present seven to twelve days following pyrexia in 3 of the pigs. The fourth, pig 99 which was in contact with calf 68, had a questionable agglutination-lysis serum reaction on the eighth day postpyrexia when it was destroyed. By guinea pig and hamster inoculations, leptospires were proved to be in the kidneys or urine of all 4 pigs. Pronounced kidney lesions were not observed in any of the 4 pigs.

None of the 4 sheep manifested clinical signs of leptospirosis, none developed agglutination-lysis serum titers, and leptospires were not isolated from their organs, blood, or urine.

The 2 goats were in contact with calves 69 or 71 for 26 days without developing clinical leptospirosis and their serums did not contain leptospiral agglutinins. Both goats were then placed with infected calves 70 and 72. Nine days later, goat 87 had a temperature of 104.0 F., was lethargic, anorexic, evidenced general malaise, and

leptospires were isolated from the blood in Chang's medium.^{4,7} Goat 87 was slaughtered five days after the pyrexial response. The terminal agglutination-lysis test titer was 1:100,000. Three of 5 guinea pigs which were inoculated with urine and 3 of 5 guinea pigs which received kidney emulsion from goat 87 developed significant temperatures of over 104.0 F. and leptospires were isolated from their blood. Goat 88 remained asymptomatic as well as serologically and bacteriologically negative. Symptomatology and bacteriological findings for the animals infected by contact are summarized in table 3.

Agglutination-lysis tests of serums of all species were performed using *L. pomona*, strain Johnson, and *Leptospira icterohaemorrhagiae* AB, as antigens. The results indicated a cross serological reactivity. Some of the serums which had a titer of 1:100,000,000 for *L. pomona* evidenced an agglutination-lysis reaction in dilutions of 1:100,000 for *L. icterohaemorrhagiae*, AB. Most serums with a 1:1,000 *L. pomona* reaction produced agglutination or lysis of *L. icterohaemorrhagiae* AB, antigen at a dilution of at least 1:100. The serological data are summarized in table 4.

DISCUSSION

A possible inference that breed or type may affect susceptibility to leptospirosis is indicated by the death of 2 Hereford calves as well as by the acute hemoglobinuria which was observed only in the Herefords. Only mild transitory signs of leptospirosis were observed in the other calves. Marsh⁶ reported leptospirosis in Hereford cattle that was characterized by a severe hemoglobinuria and a 90 per cent mortality among the calves. In Wisconsin, leptospiral infections have involved calves in only three of 41 dairy herds studied, with hemoglobinuria being uncommon or inconstant.⁷

However, a rapid, acute course, a rather constant finding of hemoglobinuria, and some deaths have been reported for beef cattle and dairy calves.⁵

Small numbers of leptospiras may be shed in the urine of calves.³ Ringen *et al.*¹¹ suggested that approximately 750 leptospiras (*L. pomona*) per inoculum are required to produce 100 per cent infection in guinea pigs. Sixty-six guinea pigs were inoculated, in the present experiment, with 2.0 cc. of urine from known infected calves. The serums of 18 of these guinea pigs were negative for leptospiral agglutinins and 13 of the 18 negative serums were from guinea pigs which received the urine of calf 68, which apparently contained insufficient organisms to be infective for guinea pigs. Infection was not transmitted from calf 68 to the heifer but it was to a pig in the same pen, which suggests the possibility of a greater degree of susceptibility of swine than of cattle. Forty-four days after subcutaneous inoculation, leptospiras were not detected in the urine or kidneys of the 4 surviving calves by guinea pig or hamster inoculation. The renal-carrier and shedder state in these calves was of short duration but of a serious nature.

Evidence of transmission, by pen contact, from known infected calves to 3 of 4 pregnant heifers, all 4 pigs, and 1 of 2 goats indicates that calves may be im-

portant sources of infection. This seems to be the first authenticated occurrence of leptospirosis (*L. pomona*) in a caprine host in North America but *Leptospira grippotyphosa* infections in goats have been reported from Israel.¹²

Leptospirosis occurred in 1 heifer following 30 hours of contact with an infected calf. The ease of transmission from calves to other susceptible hosts is evidenced by the fact that these animals, with the exception of the group kept in the shed, were maintained in sanitary surroundings much better than those which would be maintained under ordinary farm conditions.

The fact that the sheep did not become infected, either in the shed or the isolation unit, may have been due to their age (3 to 4 years) or to a species characteristic of low susceptibility. *Leptospira pomona* infections in sheep have been described.² Further studies on the susceptibility of sheep to *L. pomona* and on the transmission among sheep and from sheep to other species are indicated.

Abortions did not occur and leptospiras were not isolated from the bovine fetuses, all of which were alive when the heifers were subjected to necropsy. Marked edema of the fetal kidney capsule was the most prominent gross pathological lesion. Serum agglutination-lysis titers were not evident in the fetuses of infected cattle.

TABLE 3—Bacteriological, Clinical, and Necropsy Observations of Animals Which Evidenced Leptospirosis* Following Contact Transmission

Animal	Day†	Clinical		Bacteriological‡			Necropsy	
		Temp. (F.)	Respirations	Other	Blood	Urine	Kidneys	Observations
Heifer 46	6	104.0	60/min.	Constipation.	—	—	—	33 Dam: gray-white, renal foci. Fetus: alive; fluids in body cavities, edematous kidney capsules.
Heifer 73	7	104.0	.....	.....	+ (19)	+ (25)	+	25 Dam: same as for heifer 46. Fetus: alive; edema of mesenteries and viscera; yellow, viscid allanto-amniotic fluids.
	25	105.0	103/min.	Lochia.				
Heifer 76	24	103.2	.....	.....	—	—	—	27 Dam: petechiae, gray-white foci on kidneys; liver firm and mottled. Fetus: alive; edema of renal capsule and mesenteries.
	27	103.4	104/min.	.....			
Pig 77	8	105.4	.....	.....*	—	+ (21)	+	21 Kidneys: ecchymotic hemorrhages, few gray-white foci.
	18	104.8	.....	.....		
Pig 78	14	106.5	.....	.....	+ (16)	—	+	17 Kidneys: few scattered gray foci.
Pig 99	13	104.6	.....	.....	—	+ (21)	+	21 Kidneys: few hemorrhagic foci.
Pig 600	15	105.4	.....	Diarrhea, depression.	+ (13)	+ (21)	+	21 Kidneys: cortical petechiae and discrete gray-white foci.
Goat 87	9	104.0	.....	Depression, anorexia.	+ (10)	+ (14)	+	14 No significant lesions.

* All experimental animals with demonstrable serum-agglutinin titers of 1:100,000 (or higher) except pig 99.

† Days are postexposure. Goat 87 data represented for second exposure period.

‡ Blood cultured directly in Chang's medium. Urine and kidneys proved by guinea pig or hamster inoculation technique. Numerals in parenthesis indicate days postexposure when isolations were made.

TABLE 4—Agglutination-Lysis Titers of Serums of Animals Infected by Contact Transmission*

Animal		Days postexposure					
		0 to 5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30
Heifer 46	—	—	—	—	1:10	1:10 ²	1:10 ²
Heifer 73	—	—	1:10	—	1:10	1:10 ²	—
Heifer 76	—	—	1:10	—	1:10	1:10 ²	—
Heifer 84	—	—	—	—	—	1:10	1:10
Pig 77	—	—	—	—	1:10 ²	1:10 ²	—
Pig 78	—	—	—	1:10 ²	1:10 ²	1:10 ²	—
Pig 99	—	—	—	—	—	1:10	—
Pig 690	—	—	—	1:10 ²	1:10 ²	1:10 ²	—
Goat 87	—	—	—	1:10 ²	—	—	—

* Titer expressed as dilution end point reading. Considered positive if 50 per cent agglutination or lysis or both occurred.

† Days after start of second exposure period.

A public health problem is suggested by the isolation of leptospires from the milk of heifer 73. The concentration of leptospires in 4.0 ml. of milk was sufficient to infect guinea pigs and might well be a threat to human health.

The serological results here recorded indicate a cross reaction between *L. pomona*, strain Wickard, and *L. icterohaemorrhagiae* AB.

SUMMARY

Six young calves were experimentally infected with *Leptospira pomona*. Only the 3 Herefords developed hemoglobinuria; 1 died on the eighth day postinoculation and another on the twenty-fifth day. All 6 developed leptospiremia and 4 shed leptospires in their urine.

This infection was spread, by contact, to 3 of 4 pregnant heifers, to all of 4 pigs, to 1 of 2 goats, but to none of 4 sheep. Clinical signs of infection appeared six to 24 days after exposure. The course of leptospirosis in calves, heifers, pigs, and a goat, as well as the serological results obtained following infection, are discussed.

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Neomycin in Infected Urinary Tract

Neomycin given intramuscularly, 1 Gm. per day for five days or less, was an effective bactericide in 15 of 20 persons with urinary tract infections which were resistant to most antibiotics. The five other cases had *Pseudomonas* infection. The antibiotic caused no permanent damage to the kidneys nor to the eighth cranial nerves.—*Antibiot. Med.*, Feb., 1956.

Arthrosis Therapy Compared

Of 63 cases of arthrosis of the knee joint and 35 of the hip joint in man, about half were treated by x ray, in Denmark, in 1950; half with "hydrocortisat" intrarticularly in 1954. Of the mild cases, results were good in 90 per cent of the hydrocortisone group and in 75 per cent of the x-ray group. In the more serious cases, both treatments were satisfactory in 42 to 55 per cent of the cases. The hydrocortisone treatment should be repeated in three months, x-ray therapy in two years.—*J.A.M.A.*, Feb. 25, 1956.

Avian Rickets in Wisconsin

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Rickets is caused by a lack, or improper balance, of calcium, phosphorus, and vitamin D in the body. Vitamin D is concerned primarily with the absorption, deposition, and retention of calcium and phosphorus. If it is deficient or absent, young chicks will soon develop rickets, a condition in which growing bones fail to calcify normally.¹

Chickens of all ages require a high level of vitamin D and if raised in the absence of direct sunlight they require additional quantities in their rations.² Previously, poultry rations were supplemented with vitamin D by the addition of fish liver oils such as cod-liver oil. Recently, irradiated compounds have largely replaced the fish oils and all animal feeds since they are superior products, are cheaper, and are more convenient to use.

Vitamin D₂ is produced by subjecting ergosterol, a compound contained in yeast, to the effects of ultraviolet light; but vitamin D₂ can not be utilized by poultry.² Vitamin D₃, on the other hand, can be readily utilized by poultry. It is produced by subjecting animal sterols to the effects of ultraviolet light. Poultry feeds are fortified with vitamin D₃.

Because the feed industry of today is able to combine effectively the proper minerals, vitamins, and other factors in the rations of poultry, deficiency diseases such as rickets are uncommon. Since vitamin D₃ is inexpensive, there would be little incentive for the feed manufacturer to leave it out of the ration. A deficiency of vitamin D in poultry rations could result from the following:

- 1) Failure to add it;
- 2) Vitamin D₂ being added instead of vitamin D₃;
- 3) The vitamin having an indigestible coating which would prevent it from being utilized;
- 4) An excess of oxidizing agents, such as inorganic manganese sulfate, destroying some of the vitamin as may happen when more manganese is added than is required to prevent perosis; and
- 5) The vitamin D₃, which is otherwise a stable

compound, being destroyed by improper premixing. If vitamin D₃ is premixed with any mineral element, including even common salt, or if it is premixed with dried skim milk or dried whey before mixing with the mash, there may be considerable destruction.⁴

CASE REPORTS

Case 1.—Recently, a number of 5-week-old chicks were submitted by a local hatchery representative to the Animal Disease Diagnostic Laboratory of the Wisconsin Department of Agriculture for diagnosis. They originated from a flock of 15,000 birds and had a history of being droopy and making poor weight gains. Death losses had been low. On clinical examination, leg weaknesses, "rubbery" beaks, ruffled feathers, and evidence of pain in the tibiotarsal joints were observed. The birds were uneven in size. On necropsy, their bones were soft. The occipital bone was so soft that when birds were killed in the usual manner, by manually inducing cervical subluxation, the thumb penetrated the cranial cavity with ease. The long bones were not well calcified and did not break with the usual snap. Green stick fractures (subperiosteal fractures which exhibited no crepitation) were produced when determining bone strength. The tibiotarsal articulations of some of the birds were enlarged and in some there was an enlargement or "beading" of the ribs at the costochondral articulations. In addition to the rickets, a severe cecal coccidiosis was suspected, and was confirmed microscopically, even though an effective coccidiostat was supposed to have been present in the ration. This, with the vitamin D deficiency, suggested that perhaps neither the coccidiostat nor the vitamin had been added at the correct preventative levels, if at all. A diagnosis of rickets and cecal coccidiosis was made on the basis of these findings.

Case 2.—A few days later, some 5-week-old chicks were received from a flock of 15,000. The owner reported that, according to a manual of poultry diseases published by an unidentified drug company, they had symptoms of Newcastle disease and pullorum disease. Both rickets and coccidiosis were again diagnosed. It was then revealed that these chicks were from the same flock as those in which rickets and coccidiosis had been diagnosed a few days previously. However, these were pre-

From the Poultry Disease Diagnostic Section, Animal Disease Diagnostic Laboratory, Wisconsin Department of Agriculture, Madison.

sented by a salesman for the feed company.

Cases 3 and 4.—Chicks were received from two other flocks which were being fed the same commercial feed as the birds in the previous cases. Rickets was again diagnosed in both these flocks although the feed company questioned the diagnosis. Coccidiosis was not found in these chicks and routine bacteriological examination revealed no pathogenic bacteria.

DISCUSSION

The silver nitrate-staining method of demonstrating rickets was performed in accordance with the Official Methods of Analysis of the Association of Official Agricultural Chemists. This test showed only a slight degree of calcification of the metaphyses of each bone section. Histopathological sections of the affected bones showed that the conversion of osteoid tissue to calcified bone had been retarded. Tibias from 5- and 6-week-old birds produced 37 per cent of ash as compared with a normal 47 per cent for birds of this age.³ When the feed company submitted samples of their feed and some of the affected birds to the Wisconsin Alumni Research Foundation, Madison, Wis., the diagnosis of rickets was confirmed. Rat-feeding tests at the Foundation indicated that there was no vitamin D in the ration; also, the bone ash of the tibias of 5-week-old birds submitted to them* was 35 per cent. The Feed and Fertilizer Section of the Wisconsin State Department of Agriculture, at Madison, also confirmed the diagnosis of rickets, finding only 37 per cent ash in tibias of 6-week-old birds.

SUMMARY

Rickets was found (4 cases) in chicks originating from three large Wisconsin flocks, all on the same commercial feed. The clinical signs as well as the gross and microscopic lesions of rickets exhibited in these cases are described.

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*When rickets is suspected, the tibias of several birds should be removed, placed in 70 per cent alcohol, and submitted to a diagnostic laboratory for a quantitative ash analysis. The history and age of the birds should be included.

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Arteriosclerosis in Mammals

Arteriosclerosis has been found in dogs, cats, lions, tigers, elephants, birds, horses, cows, baboons, gorillas, llamas, and may occur in all mammals. It becomes worse with age. Coronary attacks bringing death have been observed in some of these species.

The lesions always start with deterioration of the intima, followed by a deposition of mucoid substances. Fatty deposits did not seem to play a role in animals. Fatty deposits, formerly believed to start the disease in man, now appear to be important only in the later stages and in causing death.—*Sci. News Letter*, Feb. 25, 1956.

Chlorpromazine in Equine Tetanus

A draft gelding, 9 years old, developed tetanus, apparently from a harness gall posterior to the withers. It was given 400,000 units of antitoxin intravenously in 1 liter of horse serum. Its condition deteriorated in the next 24 hours (it was anxious, tense, had violent spasms at a sudden sound, prominent nictitating membranes, dilated nostrils, and only lateral movements of the mandible were possible).

Chlorpromazine hydrochloride (500 mg. in 5 % sol.), given to the horse intramuscularly, was followed by relaxation and no response to sound or touch. Thereafter, for seven days, 250 mg. was given every 12 hours and 3,000,000 units of penicillin daily. The horse thus was able to eat, drink, and defecate. When withdrawn, the symptoms increased so the chlorpromazine was resumed for three days. One month after diagnosis, the horse was at work.

The chlorpromazine injections caused tended swelling in the muscles but these disappeared in a week.

The antitoxin is credited with neutralizing the toxin not already fixed, the antibiotic with preventing further production of toxin, and the chlorpromazine with avoiding exhaustion and allowing the horse to take nutrients normally.—*J. South. Afric. Vet. M. A.*, Dec., 1955.

Nutrition

Effect of Hay to Grain Ratio on Calves

As the ratio of clover-timothy hay to grain was increased from 4:1 to 2:3 during the first 12 weeks in rumen-inoculated calves, they showed an increasing weight gain and efficiency of feed utilization. The rumen pH increased with advancing age, but at a lower level in calves fed more grain. The rumen bacteria and protozoa also gradually increased with age, but at a slower rate in calves fed more grain.—*J. Dai. Sci., Feb., 1956.*

Estrogenic Activity of Green Feeds

The estrogenic activity of alfalfa was significantly higher in the first (spring) crop during early budding until the one-fourth bloom stage, than it was after that stage. This activity was also less in the second, third, and fourth crops. It was highest in the leaves.

Estrogenic activity was also detected in Ladino clover, red clover, birdsfoot trefoil, wheat, rye, and oats but not in sweet clover, soybean plants, brome grass, fescue, and orchard grass. Soybean oil meal and moldy corn also contained detectable estrogens.—*J. Anim. Sci., Feb., 1956.*

B₁₂, the Most Complex Vitamin

When the complete structure of vitamin B₁₂ was recently identified, it proved to be the largest and most complex of all such substances. It has a unique composition in that it contains a heavy metal, cobalt, and another group, cyanide, that, by itself, is toxic. The way in which vitamin B₁₂ functions on a chemical basis is still undetermined.—*Certified Milk, Feb., 1956.*

Radiation Sterilization of Food

Sterilization of food by radiation can produce undesirable color, flavor, and texture changes which are more noticeable in animal products than in vegetables. However, although irradiated fish had a good flavor for one month after treatment when stored at room temperature, the possibility of growth of *Clostridium botulinum* must be considered.

Gamma irradiation did not affect the wholesomeness of food except for the de-

struction of vitamins comparable to that in heat-processed foods.

While not yet economically feasible, the day of commercial sterilization by irradiation seems less remote.—*J. Agric. and Food Chem., Feb., 1956.*

Antibiotics and B₁₂ for Poor Horses

When penicillin was added for nine weeks to the ration of 6 debilitated horses, they showed no more improvement than did 6 controls. When vitamin B₁₂ was then added to the ration of all 12 horses, they made a distinct visible improvement after eight weeks, which was slightly greater in the group which had not previously received penicillin.

While synthesis of many B vitamins in the cecum has been demonstrated, this trial suggests that it may not always be adequate.—*Vet. Rec., Jan. 21, 1956.*

Pantothenic Acid and Reproduction

Pantothenic acid is adequate in most feeds but often low in swine feed. It was fed to gilts at different levels after they had been on a pantothenic-depletion ration for a month. At 5.9 mg./kg. of feed, gilts developed deficiency symptoms but conceived, although they farrowed abnormal pigs; while at 12.5 mg./kg., they developed and farrowed normally. The milk of these gilts contained slightly less free pantothenic acid at the lower level.—*Feed Bag, Feb., 1956 (J. Nutr., Nov., 1955).*

Algae, a Possible Protein Feed.—Since 1939, the supply of high protein feeds has more than doubled, with soybean meal providing about 50 per cent. At the University of California, algae, grown in sewage, is being harvested and tried, after processing, as a high protein chicken feed.—*Feeds Illus., Feb., 1956.*

Penicillin feeding did not increase water intake of chicks and poults; they showed less desire for water although they gained as well but not better than the controls. It had been previously shown that feeding antibiotics to pigs caused an increase in urine secretion.—*Feed Bag, Feb., 1956 (J. Nutr., Nov., 1955).*

Utilization of Vitamin A by Chicks

When carotene or vitamin A was given to chicks by drenching or feeding until about 60 hours old, from 65 to 100 per cent was absorbed in the gastrointestinal tract and it appeared as vitamin A in the liver by the fourth day and was utilized at least by the fifth day. It prolonged the survival of chicks on a vitamin A-deficient ration.—*Poult. Sci., Nov., 1955.*

Lo-Sodium Certified Milk

Interest is growing among hospitals, physicians, and cardiac patients in low sodium certified milk. It is desirable to reduce the daily sodium intake for patients with congestive heart failure, hypertension, and certain kidney disorders from 4,000 mg. or more to about 200 mg. per day. Therefore, whole milk, which contains 475 mg. per quart, must be used sparingly. The process of ion-exchange is similar to that used in water softening, purifying gelatin and fruit juices, and producing soft-curd milk. The sodium ions are replaced by potassium ions, the sodium being reduced to about 48 mg. per quart. The major constituents of the milk remain unaltered.—*Certified Milk, Nov., 1955.*

Effect of Fertilizers on Nutrition

The concentration of mineral elements in a plant is seldom directly correlated with the concentration of these elements in the soil, although the latter generally has some effect. They may also have a catalytic effect on the concentration of other elements in the plant.

The crude protein content of sedge-rush grasses has been increased from 8.5 to 13.5 per cent by nitrogen fertilizer. Also, by adding certain elements, the amino acid-tryptophan has been increased in the protein of soybeans without increasing the total protein content.

Cows at the Missouri Experiment Station were reported to have died of nitrate poisoning after eating corn heavily fertilized with nitrogen. In an experiment with dairy cows at Michigan State University there was no significant difference in the milk whether cows were fed crops raised on fertilized or unfertilized soil; however, milk tends to be of uniform composition on any ration, production falling when the ration is deficient.

At present, there is no coherent pattern of evidence that fertilizers can be used generally to improve the nutritive value of crops.—*J. Agric. and Food Chem., Jan.,*

Deficiency Blindness in Cattle

A carotene (vitamin A) deficiency in hay fed to young cattle, 6 to 15 months of age, produced a type of blindness. Contrary to the findings reported in rats, the pathological changes in the eyes were a primary atrophy of the optic ganglionic cells of the retina with occasional papilledema and atrophy of the neuroepithelial layer.—*Vet. Bull., Jan., 1956.*

Parakeratosis and Serum Fatty Acids.—

An analysis of essential fatty acids in the blood serum of pigs, with and without parakeratosis, indicates that they are not associated with development of this condition.—*Proc. Soc. Exptl. Biol. and Med., July, 1955.*

Quaternary Ammonium in Chick Rations

In a series of experiments in old and new environments, four alkyl quaternary ammonium derivatives improved the efficiency of feed utilization of chicks 8 weeks old. Growth was consistently improved in the old, but rarely in the new, environments and it was greater in the later stages of growth. Results were best at the higher levels (75 to 100 mg./lb.).—*Vet. Bull., Jan., 1956.*

Stilbestrol in Feed Affects Mice.—Reproductive disturbances, such as scrotal hernia and persistent estrus, in white mice at the Rocky Mountain Laboratory were reported by W. J. Hadlow and colleagues (*Science*, Oct. 7, 1955). The disturbances were a result of contamination of pelleted feed with diethylstilbestrol in a mill used to prepare cattle supplements.

When nicarbarazin, used to control coccidiosis, is added to the ration of hens which lay brown-shelled eggs, they will lay white eggs with reduced hatchability.—*Successful Farming, Nov., 1955.*

Editorial

Distribution of Veterinarians in the United States

From the wealth of data available in the Directory Department of the AVMA office, statistical analyses of varying types and significance can be made.

TABLE I—Distribution of Veterinarians in the United States (Based on 1956 AVMA Directory Listings)

State	No. of veterinarians	State	No. of veterinarians
Alabama	323	Nebraska	411
Arizona	114	Nevada	38
Arkansas	124	New Hampshire	56
California	1,577	New Jersey	365
Colorado	332	New Mexico	65
Connecticut	159	New York	1,262
Delaware	51	North Carolina	254
Dist. of Columbia	92	North Dakota	94
Florida	386	Ohio	1,009
Georgia	371	Oklahoma	269
Idaho	116	Oregon	240
Illinois	1,087	Pennsylvania	809
Indiana	659	Rhode Island	32
Iowa	1,046	South Carolina	145
Kansas	483	South Dakota	168
Kentucky	215	Tennessee	225
Louisiana	182	Texas	891
Maine	79	Utah	98
Maryland	312	Vermont	70
Massachusetts	236	Virginia	319
Michigan	705	Washington	447
Minnesota	629	West Virginia	80
Mississippi	148	Wisconsin	547
Missouri	573	Wyoming	62
Montana	121		
		Total	18,076

The distribution pattern of veterinarians by states, as shown in chart 1, should be of interest to the members of the AVMA. A few rather significant changes have taken place in the four years since 1952. Illinois, the sixth ranking state in number of veterinarians (800) in 1952, is now in third place (1,087), having passed Iowa (1,046), Ohio (1,009), and Texas (891).

States which have dropped in numerical ranking include: New Jersey (14th in 1952, 18th in 1956); Massachusetts (21st in 1952, 26th in 1956); West Virginia (36th in 1952, 41st in 1956); Vermont (37th in 1952, 43rd in 1956).

States which have risen in numerical ranking since 1952 include: Colorado (from 22nd to 19th place); Maryland (from 28th to 22nd place); Arkansas (from 42nd to 34th place); Utah (from 43rd to 38th place).

Total numbers of veterinarians have increased in all states during this four-year period, with the exception of Vermont. The changes are in relative numbers only and merely indicate differences in the rate of increase. Factors responsible for the rapid increase in some states and a less-than-expected growth in others deserve further study.

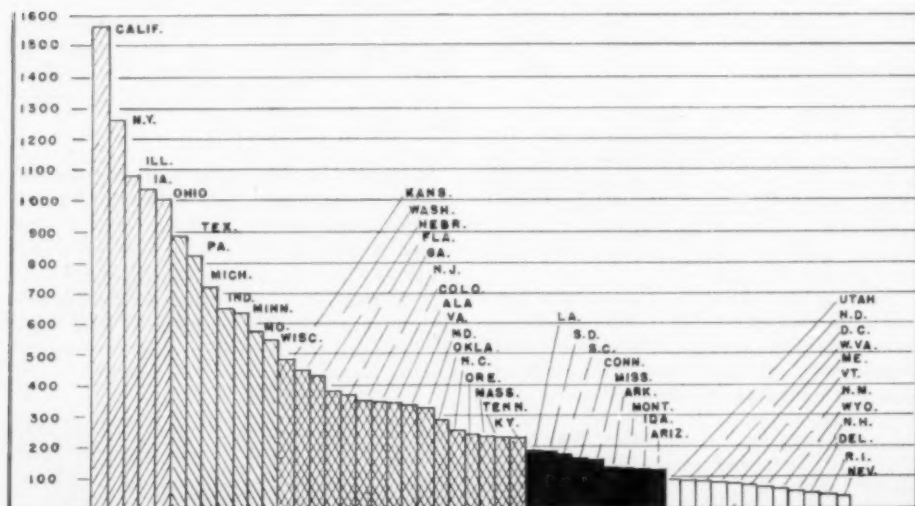


Chart I—Distribution of veterinarians in the United States by states—1956.

ABSTRACTS

Hydatid Cysts in a Mare in Britain

A Thoroughbred brood mare at an equine research station in England developed a progressive bilateral paraplegia and was destroyed. Her liver showed 112 large cysts on the surface with others completely embedded. There was one cluster of about 20 cysts; one contained 34,400 scolices. There were 15 cysts in the lungs. At the fourth lumbar vertebra level, an oval depression was found in the spinal cord, suggesting that evidence of a cyst, external to the dura mater, had been destroyed when the cord was removed.

Cysts were not found upon necropsy of 53 other horses. They were found in 4 of 200 dogs in the region.—[W. C. Miller and D. Poynter: *Hydatid Cysts in a Thoroughbred Mare. Vet. Rec.*, 68, (Jan. 21, 1956): 51-53.]

Calcium Versenate in Lead Poisoning

In Britain, 10 Jersey yearling heifers ate some white lead paint. When discovered, 1 was blind, excitable, showed incoordination, soon developed spasms, and died. Another showed some lassitude, blindness, slight incoordination, and complete cessation of rumen and intestinal movements.

The heifers were confined and each was given 12 oz. of magnesium sulfate. The second day, the sick heifer died and 3 more were showing symptoms. All were again given magnesium sulfate and calcium versenate (CaEDTA) was ordered. When the drug arrived, on the third day, the third heifer had died, so only 2 were treated. One was given 6.0 Gm. of CaEDTA in 500 cc. of glucose saline solution subcutaneously in two places, the other was given 1.5 Gm. intravenously and 4.5 Gm. subcutaneously. The subcutaneous injections caused such pain that they were completed with difficulty.

Three days after therapy, each heifer showed improvement but was given another 6.0 Gm. of the drug intravenously. Both made complete recoveries.—[E. F. Lewis and J. C. Meikle: *The Treatment of Acute Lead Poisoning in Cattle with Calcium Versenate. Vet. Rec.*, 68, (Feb. 4, 1956): 98-99.]

Tetracycline in Human Brucellosis

In Mexico, 18 *Brucella*-infected persons ranging in age from 9 to 46 years were treated with tetracycline, 1.5 to 2.0 Gm. daily for 31 to 45 days. After an initial rise, the temperature returned to normal within 48 to 120 hours and in all cases the blood cultures taken after treatment were negative. No clinical or bacteriological relapses have been noted in these patients.

The authors had previously reported on four patients with brucellosis who recovered after treatment with tetracycline. *Brucella melitensis* is the most common *Brucella* found in this region of Mexico.—[Guillermo Chavez Max and Raul Nava Fuentes: *Tetracycline in the Treatment of Human*

Brucellosis. II. Long Term Follow-Up on Eighteen Patients. Antibiot. Med., 2, (Feb., 1956): 122-123.]

BOOKS AND REPORTS

Quantitative Analysis of Drugs

This second edition of the book "Drugs and Galenicals" was compiled to satisfy the demand for more up-to-date information on medicinal chemicals. Its objective is "to survey comprehensively all medicinal drugs and their pharmaceutical preparations," this broader concept of the subject being responsible for the title change. The author has continued to select from his own experience the methods of analysis which he has found most practical but has also consulted with his colleagues.

The material is well organized and is supplemented with numerous tables and complete references to the literature.

It should prove a valuable tool to drug analysts in laboratories of commercial companies and others similarly engaged.—[*The Quantitative Analysis of Drugs*. By D. C. Garratt. 2nd ed. 670 pages, including 20-page index Philosophical Library, Inc., New York, N. Y. 1955. Price \$17.50.]

Kinships of Animals and Man

This textbook of animal biology, written by the professor of zoology in Mount Holyoke College, is unique in that it considers zoology as a living science. Animals are studied as social beings associated with their environments and as individuals, each of which contains a complex internal environment affected by the external one.

Against a background of facts scientifically accurate and well organized, the author tells the fascinating story of the relationships of animals (including man) to one another and to their environments. She shows through comparison of the external and internal characteristics of living creatures that "Environment has been a sculptor . . . in environment and outward form a whale is fish-like; in internal anatomy it is closer to a squirrel."

The text is written with six major divisions, the first four of which deal with protoplasm and the cell, tissues, organs, systems, and reproduction. The fifth part depicts the animal kingdom taxonomically and describes various animal forms in the phyla. The final part discusses evolution and applied ecology or conservation.

The numerous illustrations are exceptional; many of them are from museums and laboratories throughout the world, others were selected and drawn by professional biological artists.

Much of the latest information on carotenoid pigments and vision, cortisone treatment for arthritis, radioactive tracer substances, insects guided by light rays, photosynthesis, and the Rh factor has also been included in the text.—[*Kinships of Animals and Man—A Textbook of Animal Biology*. By Ann H. Morgan. 839 pages. Well illustrated. McGraw-Hill Book Co., New York, N. Y. 1955. Price \$6.75.]

THE NEWS

AMONG THE STATES AND PROVINCES

Indiana

Northeastern Association.—The Northeastern Indiana Veterinary Medical Association met in Fort Wayne on February 14 to hear Dr. W. R. Pritchard of Purdue University discuss virus diarrhea and mucosal infections of cattle. A motion picture "Why Be a Veterinarian?" obtained through the Associated Serum Producers, was shown and enjoyed by all.

s/J. L. KIXMILLER, *Resident Secretary.*

Wabash Valley Association.—On February 15, the Wabash Valley Veterinary Medical Association met in Kokomo to hear Dr. R. F. Baker, Spencerville, Ohio, speak on diseases of cattle and swine.

The officers of the Association are P. C. Clinger, Rochester, president; and E. L. Hill, Marion, secretary-treasurer.

s/J. L. KIXMILLER, *Resident Secretary.*

Tenth District Association.—Dr. Baron Bernard, a small animal practitioner of Cincinnati, told of his trip to the Belgian and French African Congo at the February 16 meeting of the Tenth District (Ind.) Veterinary Medical Association in Richmond. Dr. Bernard illustrated his talk with motion pictures and showed some spears used by the natives of the Congo.

s/J. L. KIXMILLER, *Resident Secretary.*

Iowa

Cedar Valley Association.—On February 13, the Cedar Valley Veterinary Medical Association met at the Elk's Club in Waterloo. Members were entertained by the Rath Packing Co. of Waterloo and the program consisted of talks by personnel of that company. The meeting was well attended and served to strengthen the relations between the veterinarians and the packing industry in Waterloo.

s/D. A. BUCHANAN, *Secretary.*

Missouri

State Association.—At the sixty-fourth annual meeting of the Missouri Veterinary Medical Association in Kansas City on February 19-21, the over-all registration totaled 482, of which 265 were veterinarians. This is the largest meeting on record for the Missouri Association.

The following officers were elected: William J. Hayden, Marshall, president; Robert D. Campbell, Cabool, president-elect; James K. Farrell, Boonville, first vice-president; Thomas M. Eagle, Parkville, second vice-president; P. E. Kimball, Stanberry, third vice-president;

and Paul L. Spencer, Jefferson City, secretary-treasurer.

Dr. J. L. Jones of Blackburn received the Missouri V.M.A.'s second "veterinarian of the year" award for his services to the profession and to the State of Missouri. Dr. Blackburn, who has been active in both professional and civic activities for many years, is now assistant state veterinarian with the Missouri State Department of Agriculture.

s/PAUL L. SPENCER, *Secretary.*

New Jersey

Northern Association.—On January 31, the following officers of the Northern New Jersey Veterinary Medical Association were installed: Seymour Lustig, Englewood, president; Edward Baker, Englewood, vice-president; and James R. Tanzola, Upper Saddle River, secretary-treasurer. The Association meets on the fourth Tuesday of each month at the Casa Mana in Teaneck.

s/JAMES R. TANZOLA, *Secretary.*

New York

New York City Association.—The regular meeting of the Veterinary Medical Association of New York City, Inc., was held March 7 at the New York Academy of Sciences. The guest speaker, Dr. F. J. Kingma, director of veterinary clinical investigation, Abbott Laboratories, North Chicago, Ill., discussed "Fluid Therapy in Small Animal Practice," with illustrations.

s/C. E. DeCAMP, *Secretary.*

Ohio

Northeastern Association Symposium.—The Northeastern Ohio Veterinary Medical Association presented a symposium on "Practical Aspects of Veterinary Practice" at the Hotel Cleveland in Cleveland on March 28.

Both large and small animal problems were discussed by: J. DeVita, New Haven, Conn. (endocrinology as related to skin disorders); W. Banks, A. & M. College of Texas, College Station (diagnostic radiology in small animals); W. W. Armistead, dean, A. & M. College of Texas (hernia repair); S. J. Roberts, New York State Veterinary College, Cornell University, Ithaca (dairy problems); H. J. Hill, Colorado A. & M. College, Fort Collins (sterility in dairy cattle); and J. Engle, Summit, N.J. (practice management).

s/ROBERT L. HENRY.

Quebec

Quebec Society.—The Society of Veterinary Medicine of the Province of Quebec met Feb. 24, 1956, in the Commerce Building in Montreal. The program included a lecture by Dr. J. D. Nadeau, professor at the Veterinary Col-

lege, St.-Hyacinthe, "The Nutritive Aspect of Diarrhea in Calves"; and one by Dr. Guy Cousineau, also on the St.-Hyacinthe faculty, "PPLO in Veterinary Pathology."

The women enjoyed a talk on textiles, a fashion show, and a tour of the Commerce Building.

S/J. SAINT-GEORGES, *Secretary.*

STATE BOARD EXAMINATIONS

Missouri—The Missouri Veterinary Examining Board will hold its next examination for graduate veterinarians at the Veterinary Clinic, University of Missouri, Columbia, Mo., on May 21-22, 1956. Interested applicants should contact Dr. L. A. Rosner, Chairman, P.O. Box 630, Jefferson City, Mo., for application blanks and other details.

Texas—The Texas State Board of Veterinary Medical Examiners announces that the next veterinary licensing examination will be held on May 28-30, 1956, at Texas A. & M. College, College Station, Texas. The completed applications must be returned to the following address not later than 30 days before the examination date. Requests for applications and additional information should be addressed to: Mr. T. D. Weaver, executive secretary, Texas State Board of Veterinary Medical Examiners, 520 Littlefield Bldg. Austin 15, Texas.

VETERINARY MILITARY SERVICE

Veterinary Medicine Course at Walter Reed.—Distinguished guests and lecturers concerned with instructing students in the fifth veterinary medicine course, currently being conducted at Walter Reed Army Medical Center, were honored at a reception on February 12 at the Walter Reed Officers' Club. Sponsored by the Division of Veterinary Medicine of Walter Reed Army Institute of Research, the reception included in the guest list the commanding general of the Center, Major General Leonard D. Heaton; Brig. Gen. Elmer Young, chief of the U. S. Army Veterinary Corps; and Brig. Gen. Wayne O. Kester, chief of the Veterinary Service of the U. S. Air Force.

Purpose of the 17-week course is to train selected officers of the Army and Air Force Veterinary Corps in planning and directing professional veterinary service within a command and to present newer knowledge of the veterinary scientific disciplines. Lectures include advances in the basic sciences, as well as medical aspects of nuclear energy and preventive medicine.

Closed-circuit color television is used in the training program for the first time in this course. In addition to viewing televised demon-

strations of canine surgery and necropsy procedures, the students participate in classroom and laboratory work at the Walter Reed Army Institute of Research, and make field trips to nearby government departments.

At the conclusion of the course, the student officer with the highest general average will be awarded the Hoskins Memorial Medal. Originally authorized by the Army Surgeon General as a memorial to Dr. W. Horace Hoskins, the bronze medal is now presented annually by the American Veterinary Medical Association to a graduate of the Army Veterinary Medicine Course.

Included in the student roster are: Lt. Col. Thomas J. Wheelin, First Army Food Inspection Unit, New York, N.Y.; Majors Donald F. Freshour, Veterinary Food Inspection Service, Madison, Wis.; John H. Harrison, Fort Lewis, Wash.; Samuel K. Kirk, Fort Worth Depot, Fort Worth, Texas; Leslie E. Meckstroth, Sixth Army Headquarters, Presidio of San Francisco, Calif.; Bruce S. Ott, Second Army Veterinary Food Inspection Section, Baltimore, Md.; Warren J. Schneider, Fort Sam Houston, Texas; and Captains Jack D. Douglas, Fort Detrick, Md.; William L. Jones, Jr., Mather Air Force Base, Calif.; James H. McNamara, Larson Air Force Base, Wash.; and Maurice S. Verplank, Homestead Air Force Base, Fla. Also in the group are Lt. Col. Singgih Djojohusodo of the Indonesian Army; Capt. Ihsan Aysan of the Turkish Army Ground Forces; and First Lt. Fazlollah Ahdieh, Imperial Iranian Army.

Director of the course is Lt. Col. L. C. Murphy, who is assisted by Capt. Dan Mosely of the Air Force Veterinary Service. Lieutenant Colonel Chester A. Gleiser is director of the Division of Veterinary Medicine of the Walter Reed Army Institute of Research.

DEATHS

Floyd C. Akin (CVC '11), 68, Fort Worth, Texas, died Sept. 28, 1955. Dr. Akin had been a meat inspector in Fort Worth for 18 years and was in government service 37 years prior to his retirement in 1954. He is survived by a son.

Richard M. Bacon (CVC '11), 66, Fort Saskatchewan, Alta., died Sept. 12, 1955. Dr. Bacon, who had carried on farming activities as well as his practice from 1915 until his retirement in 1954, had earlier served as assistant state veterinarian in Nebraska.

Joseph J. Corkhill (GR '06), Allentown, Pa., died Dec. 5, 1955. Dr. Corkhill had practiced in Allentown for 20 years. He is survived by his widow, three daughters, and two sons.

Walter W. Fleenor (IND '15), 63, Wahpeton, N. Dak., died Sept. 16, 1955. Dr. Fleenor

represented the Twelfth District in the North Dakota House of Representatives for the past three sessions. He had been a member of the AVMA.

John A. Fries (GR '13), 71, Durand, Mich., died Aug. 9, 1955. Dr. Fries, a general practitioner, had been a member of the AVMA.

Walter L. G. Geick (StJ '15), 70, Fort Branch, Ind., died Nov. 28, 1955. Dr. Geick served with the Bureau of Animal Industry in Omaha, Neb., at the South St. Paul field station, and for 20 years at Waterloo, Iowa. He retired after 30 years with the BAI and moved to Fort Branch, Ind., where he resided until his death. Dr. Geick had been a member of the AVMA. He is survived by his widow and two sons, one of which, Harold L. Geick (ISC '34), lives in St. Paul, Minn.

Ralph Graham (ISC '02), 77, Jefferson City, Mo., died Nov. 19, 1955. Dr. Graham had served with the U.S.D.A. Bureau of Animal Industry in Jefferson City from 1918 until his retirement. He is survived by his widow and a son.

Jay W. Harrison (MCK '14), Sandusky, Mich., died Feb. 3, 1956. Dr. Harrison had recently been honored by the Thumb Veterinary Medical Association, along with other veterinarians of the area who had practiced 40 years or more.

Walter L. Horn (CVC '16), 68, Valders, Wis., died Sept. 7, 1955. Dr. Horn, a general practitioner, was a member of the Wisconsin Veterinary Medical Association and of the AVMA.

Frank E. Kling (IND '11), Oakland, Calif., died Jan. 23, 1956. Dr. Kling was a small animal practitioner.

Otto L. Kranz (IND '20), 68, Indianapolis, Ind., died Dec. 11, 1955. Dr. Kranz had served in the federal meat inspection service for 20 years. He retired in 1952.

★**Charles E. Massinger** (UP '27), 53, Phoenixville, Pa., died recently. Dr. Massinger, a general practitioner, had served in the Veterinary Corps of the U. S. Army.

Elmer E. McDaniel (MCK '06), 70, Port Clinton, Ohio, died recently. Dr. McDaniel served as a meat inspector with the U.S. Bureau of Animal Industry until his retirement in 1950. He is survived by four sons and two daughters.

Aylmer R. Monroe (ONT '10), Calgary, Alta., died Sept. 18, 1955. Dr. Monroe, a well-known breeder of race horses, was a member of the Alberta and Canadian Veterinary Medical Associations. His ready wit, humor, and in-

terest in the other fellow's problems will long remain an inspiration to those who knew him.

Archie L. O'Banion (ISC '07), 73, Santa Barbara, Calif., died Feb. 18, 1956. Dr. O'Banion served with the U. S. Bureau of Animal Industry on meat inspection and field work after receiving his D.V.M. degree. He became a field veterinarian and assistant state veterinarian of California, 1916-1920, and then operated a dairy for several years. He returned to state work prior to his retirement in 1952. Dr. O'Banion is survived by his widow.

John W. Ornduff (KCV '08), Albia, Iowa, died July 8, 1955. Dr. Ornduff was a general practitioner.

C. B. Orvis (CHI '86), 97, Milton, Calif., died in December, 1955. Dr. Orvis was the first graduate veterinarian to locate in Stockton, Calif.

W. L. Parrish (API '17), 65, Clanton, Ala., died Jan. 31, 1956. Dr. Parrish had served for the past three years on the board of trustees of the Alabama Polytechnic Institute at Auburn. He is survived by his widow, two daughters, and a son.

★**Nelson A. Runquist** (CVC '19), 67, Annandale, Minn., died Feb. 15, 1956. Dr. Runquist not only rendered distinguished service as a veterinary practitioner, but also contributed much to civic affairs in Annandale. Included in this dedication of time and interest to community affairs were two terms as councilman, three terms as mayor, and past commander of the local American Legion Post. He was a member of the Minnesota Veterinary Medical Society; the AVMA, which he joined in 1919; and of Alpha Psi, honorary veterinary society.

★**Joseph H. Ryland** (API '23), 55, Selma, Ala., died Jan. 26, 1956. Dr. Ryland served as a member of the Alabama Veterinary Medical Examining Board for several years and as president of the Board for one term. He was a member and past-president of the Alabama Veterinary Medical Association and was admitted to the AVMA in 1937. Dr. Ryland is survived by his widow.

Joseph F. Talbert (CVC '03), 81, Kansas City, Mo., died Dec. 20, 1955. Dr. Talbert had served with the Bureau of Animal Industry from 1906 until his retirement in 1936. His widow, a son, and a daughter survive.

William S. Trigg (GWU '14), 64, Riverview, Fla., died Aug. 16, 1955. Except for military service during World War I, Dr. Trigg served with the U.S.D.A. from 1914 until his retirement in 1951. He is survived by his widow, four sons, and a daughter.

★Indicates members of the AVMA.

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ORGANIZATION SECTION

Ninety-Third Annual Meeting San Antonio—October 15-18, 1956

San Antonio Is Rich in History

Those attending the 1956 AVMA convention in San Antonio, Texas, will be assured of finding a great diversification of interest as well as the answer to a desire for life that is different among the scenic and historic attractions of this city.

While San Antonio is looked upon largely as a resort city, it has contributed much to the State of Texas and to this great country of ours. The city's skyline is backed by miles of attractive homes set upon hillsides stretching to the north, east, and west along the lovely river valley to the south.

The Alamo is the most famous of the missions. The present building is the old chapel of Mission San Antonio de Valero, founded in 1718 by the Franciscans. In 1836, during the war for Texas' independence, the Alamo was the scene of one of the most heroic events in the history of our nation.

All of the defending Texas soldiers were killed while besieged by troops under the Mexican general, Santa Anna. The battle cry, "Remember the Alamo," carried Texans to victory at San Jacinto 46 days later.

La Villita (the little Spanish town), a quaint

old Spanish village, founded in 1536, 300 years before Texas won her independence, is located only a short distance from the Plaza Hotel. Suffice it to say that here will be found a setting for frontier festivals, gay parties, and banquets to thrill the hearts of conventioners.

One of the most picturesque, although the smallest of the missions in San Antonio, is Mission San Juan Capistrano, founded in 1731. This ancient building stands as a monument to the labors of the priests among the Indians.

Looking at the ruins, it is easy to visualize the life lived at the mission with its granaries, the deep well, cells of the priests, and the workrooms where the Indian neophytes learned to weave and to build; the fields where they planted grain and vegetables and raised cattle, horses, mules, sheep, goats, and chickens.

Breckenridge Park, a Beauty Spot

Breckenridge park has spread its name and fame the country over, because it is truly one of the nation's finest. This beautiful area, located away from the hue and cry of the business district, is frequented by localites and visitors the year round. The Chinese sunken gardens, one of America's most attractive

(Continued on p. 19)



This old adobe building was originally used by the Spanish governors of Texas. Its keystone bears the Hapsburg coat-of-arms.



The Chinese sunken gardens, one of America's loveliest, is located in Breckenridge Park in San Antonio.

(Continued from p. 18)

spots, is situated at the edge of this great outdoor recreational center. The garden has a lily pond covering approximately a half acre.

There is one more mission we want to call to your attention because it is outstanding among the old buildings which link the modern city of San Antonio with its glamorous past, Mission San Jose de Aguayo, just outside of the city limits.

This mission was named in honor of St. Joseph and in deference to San Miguel de Aguayo, the governor of the Spanish province of Texas. Here, with patience and toil, the Franciscans succeeded in teaching the Indians reading, writing, sanitation, art, music, and the

crafts of those early days. Like all of the others, this mission is well worth visiting.

An Outdoor Theater on the Arneson River

A colorful and unique theater, known as the Arneson River Theatre, has been set on the banks of the San Antonio River ("Venice of Texas") which flows through the very heart of the business district. Tropical plants, shrubbery, and palms are found along the fertile river banks and colored lights make a truly picturesque scene of the river by night. All one needs to add to the enchantment is to glide gently down the stream in one of the attractive gondolas—a treat afforded visitors that will be long remembered.

Award Nominations Invited

President Floyd Cross, chairman *ex officio* of the AVMA Committee on Awards, announces that members are invited to submit nominations for the awards administered by the Association which are to be given in 1956.

This Committee selects the recipients for three awards: the XIIth International Veterinary Congress Prize, the AVMA Award, and the Borden Award. A fourth award, the Humane Act Award, is also administered by the Association, but nominations for it are handled, and recipients selected by, the Special Committee on Humane Act Award (see adv. p. 20 of this issue).

XIIth International Veterinary Congress Prize

Established in 1936, this award consists of a cash prize of \$125 and a certificate. It is bestowed in recognition of "outstanding service by a member of the AVMA to veterinary science and the

veterinary profession." To date, there have been 19 recipients: Drs. D. H. Udall, G. H. Hart, J. R. Mohler, I. F. Huddleson, A. Eichhorn, R. A. Kelsner, Otto Stader, D. F. Luckey, L. A. Merillat, T. H. Ferguson, W. J. Butler, A. E. Cameron, G. Dikmans, N. S. Mayo, R. S. Sugg, C. E. Cotton, L. Van Es, F. W. Schofield, and B. T. Simms.

AVMA Award

Established in 1931, this award was not activated until 1943. It consists of a medal and certificate and is bestowed in recognition of "meritorious service to the membership." There have been seven recipients to date. Drs. J. R. Mohler, L. A. Merillat, A. H. Quin, A. A. Husman, G. W. Gillie, N. J. Miller, and C. W. Bower.

Borden Award and Medal

Established in 1944, the Borden Award consists

(Continued on p. 22)

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of skin conditions!

- ★ **DESTROYS** fungi; sarcoptes scabiei canis; demodex canis; mites; fleas; lice.
- ★ **NON STAINING** not greasy; has no objectionable odor; in fact it destroys odors of external origin.
- ★ **NON TOXIC** may be used daily in recommended dilution.
- ★ **CONCENTRATED** one gallon makes four.

GALLON **\$13.95**

Makes 4 gallons

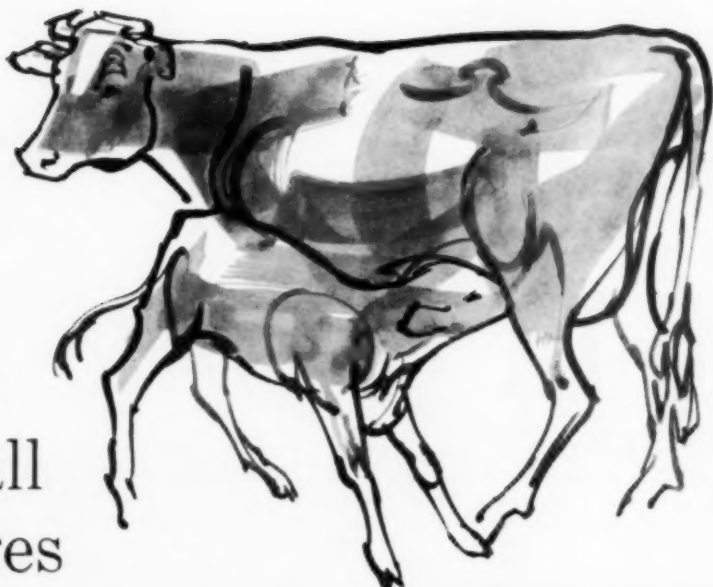
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TERRAMYCIN TABLETS: 500 mg., scored, foil-wrapped. Folders of 2. Boxes of 5.

TERRAMYCIN OINTMENT: 5 mg. of oxytetracycline and 10,000 units of polymyxin B sulfate per Gm. Tubes of 1 oz.

30 mg. of oxytetracycline and 10,000 units of polymyxin B sulfate per Gm. Tubes of 1 oz.

TERRAMYCIN CAPSULES: 50 mg. in bottles of 25 and 100; 100 mg. in bottles of 10, 25, and 100; 250 mg. in bottles of 8, 16, and 100.

TERRAMYCIN OPHTHALMIC OINTMENT: 5 mg. of oxytetracycline and 10,000 units of polymyxin B sulfate per Gm. Tubes of $\frac{1}{4}$ oz.

TERRAMYCIN POULTRY FORMULA: 25 Gm. of oxytetracycline activity per lb. Bottles of 1.6 oz., $\frac{1}{2}$ lb., and canisters of 10 lb.

TERRAMYCIN SUSPENSION IN OIL: 25 mg. of oxytetracycline per cc. Bottles of 500 cc.

TERRAMYCIN ANIMAL FORMULA FOR MASTITIS: 30 mg. of calcium dioxytetracycline and 10,000 units of polymyxin B sulfate per Gm. Tubes of $\frac{1}{2}$ oz. Bottles of 150 cc.

TERRAMYCIN ANIMAL FORMULA SOLUBLE POWDER: 25 Gm. of oxytetracycline activity per lb. Bottles of $\frac{1}{4}$ lb., $\frac{1}{2}$ lb., and 1 lb. and canisters of 5 lb. and 10 lb.

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Department of Veterinary Medicine

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ORGANIZATION SECTION

(Continued from p. 19)

of \$1,000 in cash and a gold medal. It is bestowed in recognition of "outstanding research contributing to dairy cattle disease control." The conditions specified by the donor require that the recipient (not necessarily a veterinarian) shall have published the results of his work in recognized scientific journals and that a statement shall be furnished the Borden Company Foundation setting forth the qualifications of the recipient, together with a pertinent bibliography of his published investigations.

There have been 12 recipients of the Borden Award: Drs. I. F. Huddleson, W. L. Boyd, W. E. Cotton, J. Traum, A. F. Schalk, R. R. Birch, J. Farquharson, L. A. Klein, R. B. Little, G. H. Hart, M. G. Fincher, and H. E. Kingman, Sr.

Deadline for Nominations

Nominations for any of the foregoing awards should be addressed by AVMA members to: Committee on Awards, American Veterinary Medical Association, 600 S. Michigan Ave., Chicago 5, Ill., and must be received not later than July 15, 1956.

Each nomination should contain specific details and comprise a brief of the nominee's accomplishments and qualifications for the award in question. The nomination must also contain brief biographical data, including an account of the nominee's professional background and experience. Eight copies of the data and brief must be furnished.

The Committee on Awards will review the various nominations and supporting data and select recipients for this year's awards; the awards will be presented to the recipients at the opening general session of the AVMA convention in San Antonio, October 15-18.

The Committee on Awards is *ex officio* and comprises Drs. Floyd Cross, chairman (as president of the AVMA); Wayne O. Kester (as president-elect); J. M. Arburua (as chairman of the Executive Board); K. F. Wells (as veterinary director-general of Canada); W. A. Hagan (as AVMA representative to the Division of Medical Sciences, National Research Council); E. W. Young (as chief of the Army Veterinary Corps), and M. R. Clarkson (as deputy administrator, Agricultural Research Service, U.S.D.A.).

AVMA Seeks Nominations for 1956 Humane Act Award

Veterinarians and students in veterinary medicine throughout North America are being asked to submit nominations for the AVMA Humane Act Award, given annually to a boy or girl not over 18 years old, who has performed an outstanding act of kindness to animals.

Deeds on behalf of dogs and cats have predominated in the winning column since the initiation of the award in 1944, but the committee in charge of the project emphasizes

that kindness to livestock and wild animals is just as acceptable in determining the winner.

Nominations should be sent to the American Veterinary Medical Association, 600 S. Michigan Ave., Chicago 5, Ill.

The winner will be announced at the AVMA national convention in San Antonio, Texas, October, 15-18. The award consists of a framed certificate describing the act of kindness and a \$100 U. S. Savings Bond.

Last year's winner was a 10-year-old girl who rescued a drowning dog from a frozen lake. Among winners of the award in the past have been a high school student who advocated the use of maternity pens as a means of combating diseases of calves and calf injuries at birth, a boy who rescued a dog trapped in a 300-foot deep canyon, a boy who built a bumper device to protect a blind dog that had been his childhood pet, a girl who captured a rabid dog, and a boy who rescued some valuable show horses from a burning barn.

WOMEN'S AUXILIARY

Mrs. Veterinarian—Fifteen Years Old (Almost).—At the time I became Mrs. Veterinarian, my husband and I were in uniform and doing our best to help bring World War II to a speedy end. None of the training received by student veterinary wives of today was available to me; I learned fairly soon, however, that Army veterinarians did everything from mess inspection (including garbage cans) to the treatment of injured and sick war dogs at secret radar installations. Such terms as heartworm, brucellosis, mastitis, bloat, blackleg, and foot rot gradually became familiar to me. Unfortunately, the need for veterinarians in the South Pacific suddenly became acute, and my training was abruptly terminated for a year.

The end of the war saw us on our way to New Haven, Conn., for a brief interlude of meat inspection before enrolling in the Department of Public Health at the School of Medicine of Yale University. Going to school with the aid of the GI Bill of Rights was somewhat strenuous on our pocketbook; consequently, we established a part-time veterinary practice.

Upon my husband's graduation from Yale with an M.P.H. degree in June, 1947, it was difficult to go forward with plans to enter the field of public health, as our mixed animal practice was beginning to thrive. On October 1, however, we headed west to Phoenix, Ariz., with a commission in the United States Public Health Service. Here a research project on beef tapeworm was undertaken. The Public Health Service, the U. S. Department of Agriculture, and the State of Arizona were interested in finding out why the incidence of beef tapeworm was so high in the cattle raised on certain

(Continued on p. 24)

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ORGANIZATION SECTION

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ranches in the Phoenix Salt River Valley area. The results of this research were published in the *JOURNAL* of the AVMA in May, 1950. An interesting sidelight in connection with this study was an Indian powwow staged by one of the Arizona ranchers in order to get the cooperation of his Indian employees to submit fecal samples for examination. (The Indians were shy of our medical mores and had refused to cooperate.)

At the completion of the Arizona project in 1949, my husband requested an inactive duty status with the U. S. Public Health Service in order to accept a position with the New Jersey State Department of Health. We decided upon this because we felt our children should have a permanent home. We are now beginning our eighth year as Princetonians and find the position of chief of the Bureau of Veterinary Public Health one which has a steady flow of interesting problems, e.g., vesicular exanthema, psittacosis, anthrax, trichinosis, rabies, eastern equine encephalomyelitis, and others.

From time to time, we have had the pleasure of entertaining veterinarians from other countries—Sweden, Siam, China, Japan, and South Africa. Our children were especially attracted to Dr. Takeo Matsui of Tokyo, who read and sang to them every evening during his visit.

My life has not, I believe, been typical of most veterinary wives because relatively few veterinarians are primarily engaged in public health work or have as their main interest the zoonoses. There have been no records to keep, no bills to send, and only occasional telephone messages. The wife of a public health veterinarian, however, must encourage her husband when there are lengthy delays in the passage of needed legislation (because change is always slow); when there is endless red tape in the administration of a program; when salary scales get out of line. Because some public health problems take years to solve, the ability to extol the virtues of patience is another requirement which goes hand in hand with encouragement. Skill in reading copy and editing papers for publication are also helpful to one's husband. One more thought I would like to leave with you is: Mrs. Veterinarian should constantly work with her husband to educate the public as to the broad scope and highly scientific nature of present-day veterinary medicine.

s/(MRS. OSCAR) JANE SUSSMAN, Member,
Women's Auxiliary to the New Jersey V.M.A.

Louisiana Auxiliary.—The Women's Auxiliary to the Louisiana Veterinary Medical Association held its spring meeting on the campus of the Louisiana State University, Baton Rouge, on Jan. 31, 1956.

The morning was occupied with registration, collection of annual dues, and informal chats.

The luncheon and business meeting, held at the Faculty Club on the campus, was attended by 25 members and three guests.

Mrs. David H. Traylor, Shreveport, vice-president, presided over the business meeting. The revised constitution and bylaws was adopted by the group. Mrs. W. T. Oglesby, official delegate to the Minneapolis meeting of the AVMA Auxiliary, gave her report and urged that everyone attend the national meeting which will be held in San Antonio, Texas, October 15-18, in connection with the ninety-third annual meeting of the AVMA.

The following officers were elected and installed: Mrs. L. L. Landon, Covington, president; Mrs. John Morrison, Opelousas, vice-president; Mrs. W. T. Oglesby, Baton Rouge, official delegate; and Mrs. L. L. Landon, Covington, alternate delegate.

In the evening, the women joined their husbands for a banquet and dance at Spinosa's Restaurant.

s/(MRS. W. T.) NADENE D. OGLESBY, Secretary.

Oregon Auxiliary.—The winter meeting of the Women's Auxiliary to the Oregon State Veterinary Medical Association was held in Portland, Jan. 27-28, 1956. Mrs. Ralph Younce and Mrs. R. L. Bean of Hillsboro were in charge of arrangements of the women's activities.

After a luncheon at the Hilarie Restaurant in downtown Portland, the following officers were installed: Mrs. Austin Eivers, Salem, president; Mrs. Ralph Younce, Hillsboro, vice-president; Mrs. L. Jones, Roseburg, secretary; and Mrs. K. J. Peterson, Salem, treasurer.

Each year the Auxiliary, in memory of the deceased veterinarians of that year, sends a book to one of the western veterinary medical schools. This year the book was sent to Washington State College.

The group voted to send donations to the AVMA Research Fund and to the Student Loan Fund of the Women's Auxiliary to the AVMA.

Mrs. L. Derflinger, Salem, was selected as delegate to the annual meeting of the Women's Auxiliary to the AVMA in San Antonio, Texas, October 15-18, held in connection with the ninety-third annual meeting of the AVMA.

Our guest, Mrs. E. A. Woelffer, Oconomowoc, Wis., second vice-president of the AVMA Auxiliary gave us more specific information on the Student Loan Fund.

Our annual spring meeting will be held April 28 in Pendleton.

s/MRS. DENNIS DEJONG, Retiring Secretary.

Wisconsin Auxiliary.—The Women's Auxiliary to the Wisconsin Veterinary Medical Association held its annual meeting on Jan. 11-13, 1956, at the Hotel Schroeder in Milwaukee, in

(Continued on p. 26)



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This spring Purina's 50-millionth ton of Chows came off the production line in Checkerboard Square.

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ORGANIZATION SECTION

(Continued from p. 24)

conjunction with the annual meeting of the Wisconsin Veterinary Medical Association. Registration began at noon the first day and a family get-together with lunch and entertainment was held in the evening.

The activities on the second day included a coffee hour, the executive board meeting, an auxiliary luncheon followed by a program, and business meeting. In the evening, a banquet was held in the Empire Room with the members of the Wisconsin V.M.A.

The following new officers were installed: Mrs. W. A. Thomson, Platteville, president; Mrs. George Lynch, Milwaukee, first vice-president; Mrs. Glenn Downing, Waukesha, second vice-president; Mrs. Paul Candlin, Madison, secretary-treasurer; Mrs. Robert Romaker, Madison, membership chairman; Mrs. A. I. Moyle, Union Grove, historian; Mrs. M. L. Kastner, Cuba City, publicity chairman; and Mrs. W. R. Winner, Madison, advisor. Mrs. Winner was president of the group during the past year.

s/MRS. W. A. THOMSON, President.

STUDENT CHAPTER ACTIVITIES

Alabama Chapter.—At the January 10 meeting of the Alabama Polytechnic Institute Student Chapter of the AVMA, the following officers were elected: Guy Branscombe, president; David Hatchett, vice-president; Howard Mynatt, secretary; and Jim Robinson, treasurer.

At the January 24 meeting, Judge J. R. McElroy of Birmingham presented an informative talk on veterinary jurisprudence. The February 7 meeting featured a message from the Rev. Joel McDavid on "Service in the Community." Plans were announced for cooperative consultation between our Chapter and the School of Architecture. Seniors in both schools have been assigned to work together to prepare drawings of small animal clinics. There are indications that this innovation will be continued with future graduating classes.

s/WILLIAM R. KLEMM, Publicity Chairman.

Ohio Chapter.—The following officers were recently elected to serve the Ohio State University Student Chapter of the AVMA: George R. Blind, president-elect; Carlton C. Stanforth, vice-president; Ralph W. Storts, secretary; Donald L. Beckett, treasurer; and John Andreas, president.

This semester's speakers included Dr. A. F. Weber, of the University of Minnesota, and Father O'Rourke of the University of Illinois. At the February 8 meeting, a panel of three veterinarians (M. W. Bates, Columbus; J. B. Wenger, Columbus; and P. A. Soldner, Spring-

field) discussed small animal problems. Dr. E. J. Catcott was moderator.

s/RALPH W. STORTS, Secretary.

Texas Chapter.—The Texas A. & M. Student Chapter of the AVMA has enjoyed a successful semester. The speakers for the meetings have been outstanding and the meetings well attended.



Mr. Echols (right) presenting the Borden Award to Walter Roe.

The annual functions began with the smoker which enabled chapter members to renew their acquaintances and gave freshmen an opportunity to meet the upperclassmen and professors.

Speakers for meetings during the fall semester were Drs. R. D. Turk, head of the Department of Parasitology at Texas A. & M.; Grady Goodman, Lockhart; Hugh Phillips, Henderson; R. D. Radeleff, experiment station at Kerrville; and Dan Anderson, Dallas.

The Women's Auxiliary and the Chapter jointly sponsored a smorgasbord and dance to raise funds for the entertainment of the student delegates and wives at the 1956 AVMA convention in San Antonio.

On Nov. 29, 1955, Mr. Woodrow Echols, a representative from the Borden Company, presented Walter E. Roe, Jr., with the Borden Award—a check for \$300—for maintaining the highest grade average through four years of veterinary school.

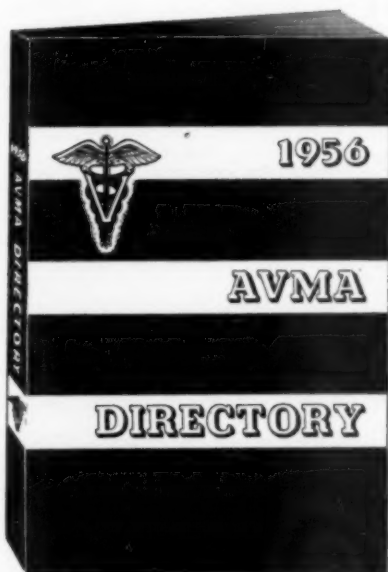
Election of officers to serve the Chapter for the spring semester was held recently with the following results: Bill Ard, president; Jerry Van Hoosier, president-elect; Wallace Kleb, vice-president; William H. Buller, secretary-treasurer; Virgil Patrick, parliamentarian; Dick Crawford, reporter; and Roy Chaney, sergeant-at-arms.

Faculty sponsors for the spring term are Drs. A. A. Price and G. S. Trevino.

s/EUGENE T. SKIDMORE, Secretary.

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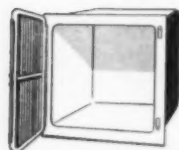
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Tuskegee Chapter.—The first meeting of the Tuskegee Institute Student Chapter of the AVMA was held Sept. 23, 1955, at which time Raleigh H. Allen, Jr., president, and other elected officers were installed.

Dr. George W. Cooper, the advisor, presented the history of veterinary medicine from its inception to the present time. A business session was held and the group then enjoyed an informal session honoring the freshmen students, with refreshments provided by the women's auxiliary.

On October 20, Dr. Cooper reported on the AVMA convention in Minneapolis. Dr. Eugene Adams spoke on nuclear radiation and veterinary medicine at the November 17 meeting. On December 10, the Chapter sponsored an open house for the veterinary school as a means of informing people in the surrounding community of the various aspects of veterinary medicine. On December 15, after a business meeting, members adjourned to enjoy the annual Christmas party.

The January 19 meeting was a business session at which committee reports were read.
S/THELMA DEAN, *Secretary*.



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COMING MEETINGS

- Northern Illinois Veterinary Medical Association. Annual spring meeting. Hotel Faust, Rockford, Ill., April 18, 1956. J. M. Nelson, Sycamore Rd., Rt. 23, DeKalb, secretary.
- Iowa, North Central Veterinary Medical Association. Annual meeting. Warden Hotel, Fort Dodge, April 19, 1956, at 10:00 a.m. H. Engelbrecht, Fort Dodge, secretary.
- Eastern Iowa Veterinary Association, Inc. Annual all-day practitioners' clinic. Hawkeye Downs, Cedar Rapids, May 8, 1956. Forrest E. Brutsman, Traer, secretary.
- American Animal Hospital Association. Annual meeting. Hotel Fontainebleu, Miami Beach, Fla., May 23-26, 1956. W. H. Riser, 5335 Touhy Ave., Skokie, Ill., executive secretary.
- Georgia Veterinary Medical Association. Annual meeting. General Oglethorpe Hotel, Savannah, June 10-12, 1956. C. C. Rife, 505 Lindbergh Dr. N.E., Atlanta, secretary.
- California State Veterinary Medical Association. Annual meeting. Hotel Statler, Los Angeles, June 10-13, 1956. Charles S. Travers, 3004 16th St., San Francisco, executive secretary.
- Ohio State University. Annual spring conference for veterinarians. Ohio Union Building, Ohio State University, Columbus, June 13-14, 1956. Robert L. Henry, executive secretary.
- Michigan State Veterinary Medical Association. Annual meeting. Bancroft Hotel, Saginaw, June 21-22, 1956. Paul V. Howard, 4011 Hungsberger, N.E., Grand Rapids, secretary.
- Vermont Veterinary Medical Association. Annual summer conference. The Lodge at Smuggler's Notch, Stowe, June 21-22, 1956. A. E. Janawicz, Department of Agriculture, Montpelier, secretary.
- North Carolina Veterinary Medical Association. Annual meeting. Greensboro, N. C., June 25-27, 1956. Martin P. Hines, Raleigh, executive committee.
- Maritime Veterinary Associations. Annual joint conference. Mount Allison University, Sackville, N. B., June 26-28, 1956. J. F. Frank, P.O. Box 310, Sackville, chairman.
- Maryland State Veterinary Medical Association. Annual summer meeting. George Washington Hotel, Ocean City, Md., June 28-29, 1956. John D. Gadd, Cockeysville, Md., secretary.
- South Carolina Association of Veterinarians. Summer meeting. Clemson House, Clemson College, S. C., June 28-30, 1956. Worth Lanier, York, S. C., secretary.
- Mississippi State Veterinary Association. Annual meeting. Buena Vista Hotel, Biloxi, July 15-17, 1956. Harvey F. McCroby, P.O. Box 536, State College, secretary.
- Iowa State College. Annual conference for veterinarians. Memorial Union, Iowa State College, Ames, July 17-18, 1956. John B. Herrick, Iowa State College, Ames, co-chairman of conference.
- Virginia Veterinary Medical Association. Semiannual meeting. Natural Bridge Hotel, Natural Bridge, July 17-19, 1956. Wilson B. Bell, 1303 Hillcrest Dr., Blacksburg, secretary.
- Canadian Veterinary Medical Association. Annual meeting. Mount Royal Hotel, Montreal, Que., July 19-21, 1956. Claude Kealey, 1195 Wellington, Ottawa 3, Ont., executive secretary.
- Alabama Polytechnic Institute. Annual conference for veterinarians. School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Ala., July 22-25, 1956. R. S. Sugg, dean.
- Colorado Veterinary Medical Association. Annual meeting. Estes Park, Sept. 7-9, 1956. G. H. Gilbert, 5500 Wadsworth Blvd., Arvada, Colo., secretary.
- Pennsylvania State Veterinary Medical Association. Annual meeting. Bedford Springs Hotel, Bedford, Pa., Sept. 12-14, 1956. Raymond C. Snyder, N.W. Corner Walnut St., and Copley Rd., Upper Darby, Pa., secretary.
- New York State Veterinary Medical Society. Annual meeting. Concord Hotel, Kiamesha Lake, N. Y., Sept. 19-21, 1956. L. W. Goodman, 2303 Northern Blvd., Manhasset, general chairman; Miss Joan S. Halat, 803 Varick St., Utica, secretary.
- Washington State Veterinary Medical Association. Annual meeting. Davenport Hotel, Spokane, Sept. 21-22, 1956. P. J. Farr, 6306 N. Wall St., Spokane 53, general chairman.
- Oklahoma conference for veterinarians. School of Veterinary Medicine, Oklahoma A. & M. College, Stillwater, Sept. 27-28, 1956. A. L. Malle, Department of Veterinary Pathology, chairman.
- Eastern Iowa Veterinary Association, Inc. Annual meeting. Hotel Montrose, Cedar Rapids, Oct. 4-5, 1956. Forrest E. Brutsman, Traer, secretary.
- American Veterinary Medical Association. Annual meeting. Municipal Auditorium, San Antonio, Texas, Oct. 15-18, 1956. J. G. Hardenbergh, 680 S. Michigan Ave., Chicago 5, Ill., executive secretary.
- U. S. Livestock Sanitary Association. Annual meeting. Morrison Hotel, Chicago, Ill., Nov. 28-30, 1956. R. A. Hendershott, 33 Oak Lane, Trenton 8, N. J., secretary.
- Nebraska Veterinary Medical Association. Annual meeting. Hotel Lincoln, Lincoln, Dec. 3-5, 1956. W. T. Spencer, 1250 North 37th St., Lincoln, secretary.

Foreign Meetings

- World Congress on Fertility and Sterility. Naples, Italy, May 18-26, 1956. Professor T. Bonadonna, Via Monte Ortigara, 35, Milan, Italy, in charge of Veterinary Section.
- Tenth International Congress of Entomology. McGill University and University of Montreal, Montreal, Canada, Aug. 17-25, 1956. J. A. Downes, Division of Entomology, Science Service Bldg., Ottawa, Ont., Canada, secretary.
- International Association of Hydatidology. Sixth Congress. Athens, Greece, Sept. 14-18, 1956. Prof. B. Kourias, 1 MacKenzie King St., Athens, Greece, general secretary.

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Regularly Scheduled Meetings

ALABAMA—Central Alabama Veterinary Association, the first Thursday of each month. G. J. Phelps, Jr., Montgomery, Ala., secretary.

Jefferson County Veterinary Medical Association, the second Thursday of each month. W. R. Laster, Jr., 213 N. 15th St., Birmingham, Ala., secretary.

ARIZONA—Central Arizona Veterinary Medical Association, the second Tuesday of each month. Keith T. Maddy, Phoenix, Ariz., secretary.

Pima County Veterinary Medical Association, the third Wednesday of each month in Tucson. E. T. Anderson, 8420 Tanque Verde Rd., Tucson, Ariz., secretary.

Southern Arizona Veterinary Medical Association, the third Wednesday of each month at 7:30 p.m. E. T. Anderson, Rt. 2, Box 697, Tucson, Ariz., secretary.

CALIFORNIA—Bay Counties Veterinary Medical Association, the second Tuesday of each month. E. Paul, Redwood City, Calif., secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. Wilfred Pimentel, 3455 S. Elm Ave., Fresno, Calif., secretary.

East Bay Veterinary Medical Association, bimonthly, the fourth Wednesday. Leo Goldston, 3793 Broadway, Oakland 11, Calif., secretary.

Kern County Veterinary Medical Association, the first Thursday evening of each month. B. C. Watson, 825 14th St., Bakersfield, Calif., secretary.

Mid-Coast Veterinary Medical Association, the first Thursday of every even month. W. H. Rockey, P. O. Box 121, San Luis Obispo, Calif., secretary.

Monterey Bay Area Veterinary Medical Association, the third Wednesday of each month. Lewis J. Campbell, 90 Corral de Tierra, Salinas, Calif., secretary.

North San Joaquin Valley Veterinary Medical Association, the fourth Wednesday of each month at the Hotel Co-

vell, in Modesto, Calif. Lyle A. Baker, Turlock, Calif., secretary.

Orange Belt Veterinary Medical Association, the second Monday of each month. Chester A. Maeda, 766 E. Highland Ave., San Bernardino, Calif., secretary.

Orange County Veterinary Medical Association, the third Thursday of each month. Donald E. Lind, 2643 N. Main St., Santa Ana, Calif., secretary.

Peninsula Veterinary Medical Association, the third Monday of each month. T. D. Harris, San Mateo, Calif., secretary.

Redwood Empire Veterinary Medical Association, the third Thursday of each month. Robert E. Clark, Napa, Calif., secretary.

Sacramento Valley Veterinary Medical Association, the second Wednesday of each month. W. E. Steinmetz, 4227 Freeport Blvd., Sacramento, Calif., secretary.

San Diego County Veterinary Medical Association, the fourth Tuesday of each month. H. R. Rossoli, 1795 Moore St., San Diego, Calif., secretary.

San Fernando Valley Veterinary Medical Association, the second Friday of each month at the Casa Escobar Restaurant in Studio City. John Chudacoff, 7912 Sepulveda Blvd., Van Nuys, secretary.

Southern California Veterinary Medical Association, the third Wednesday of each month. Howard C. Taylor, 2811 West Olive St., Burbank, Calif., secretary.

Tulare County Veterinarians, the second Thursday of each month. R. B. Barsaleau, 2333 E. Mineral King, Visalia, Calif., secretary.

COLORADO—Denver Area Veterinary Society, the fourth Tuesday of every month. Richard C. Tolley, 5060 S. Broadway St., Englewood, Colo., secretary.

Northern Colorado Veterinary Medical Society, the first Monday of each month. M. A. Hammarlund, School of

(Continued on p. 52)

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- Veterinary Medicine, Colorado A. & M. College, Fort Collins, Colo., secretary.
- DELAWARE**—New Castle County Veterinary Association, the first Tuesday of each month at 9:00 p.m. in the Hotel Rodney, Wilmington, Del. E. J. Hathaway, Clifton Park Manor, Apt. 73-5, Wilmington 2, Del., secretary.
- FLORIDA**—Jacksonville Veterinary Medical Association, the second Thursday of each month, time and place specified monthly, George F. Yopp, 4644 Main St., Jacksonville, Fla., secretary.
- Palm Beach Veterinary Society, the last Thursday of each month in the county office building at 810 Datura St., West Palm Beach, Ross E. Evans, 5215 S. Dixie Highway, West Palm Beach, Fla., secretary.
- Ridge Veterinary Medical Association, the fourth Thursday of each month in Bartow, Fla. Paul J. Myers, Winter Haven, Fla., secretary.
- South Florida Veterinary Society, the third Tuesday of each month, at the Seven Seas Restaurant, Miami, Fla. E. D. Stoddard, 6432 S. W. 8th St., Miami, Fla., secretary.
- GEORGIA**—Atlanta Veterinary Society, the second Tuesday of every month at the Elks Home on Peachtree St., Atlanta, Ga. J. L. Christopher, Smyrna, Ga., secretary.
- ILLINOIS**—Chicago Veterinary Medical Association, the second Tuesday of each month, Mark E. Davenport, Jr., 215 S. Edgewood Ave., LaGrange, Ill., secretary.
- Eastern Illinois Veterinary Medical Association, the first Thursday of March, June, September, and December. A one-day clinic is held in May, H. S. Bryan, College of Veterinary Medicine, University of Illinois, Urbana, secretary.
- INDIANA**—Central Indiana Veterinary Medical Association, the second Wednesday of each month, Charles J. York, P. O. Box 1656, Indianapolis 6, Ind., secretary.
- Michiana Veterinary Medical Association, the second Thursday of each month, at the Hotel LaSalle, South Bend, Ind. L. D. Ramsay, 719 E. Jefferson Ave., La Porte, Ind., secretary.
- Tenth District Veterinary Medical Association the third Thursday of each month, W. E. Sharp, Union City, Ind., secretary.
- IOWA**—Cedar Valley Veterinary Association, the second Monday of each month, except January, July, August, and October, at Black's Tea Room, Waterloo, Iowa. D. A. Buchanan, Grundy Center, Iowa, secretary.
- Coon Valley Veterinary Association, the second Wednesday of each month, September through May, at the Bradford Hotel, Storm Lake, Iowa. D. I. Lee, Sac City, Iowa, secretary.
- Fayette County Veterinary Association, the third Tuesday of each month, except in July and August, at Pa and Ma's Restaurant, West Union, Iowa. Donald E. Moore, Box 178, Decorah, Iowa, secretary.
- Northeast Iowa-Southern Minnesota Veterinary Association, the first Tuesday of February, May, August, and November at the Wisneslick Hotel, Decorah, Iowa, 6:30 p.m. Donald E. Moore, Box 178, Decorah, Iowa, secretary.
- KENTUCKY**—Jefferson County Veterinary Society of Kentucky, Inc., the first Wednesday evening of each month in Louisville or within a radius of 50 miles, Dr. W. E. Bewley, P. O. Box "H", Crestwood, Ky., secretary.
- MARYLAND**—Baltimore City Veterinary Medical Association, the second Thursday of each month, September through May (except December), at 9:00 p.m. at the Park Plaza Hotel, Charles and Madison St., Baltimore, Md. Harry L. Schultz, Jr., 9011 Harford Rd., Baltimore, Md., secretary.
- MICHIGAN**—Mid-State Veterinary Medical Association, the fourth Thursday of each month with the exception of November and December, Robert E. Kader, 5034 Armstrong Rd., Lansing 17, Mich., secretary.

(Continued on p. 34)

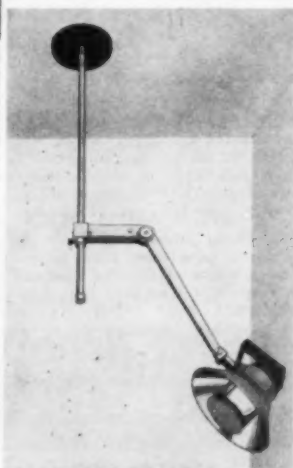
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Saginaw Valley Veterinary Medical Association, the last Wednesday of each month. S. Correll, Rt. 1, Midland, Mich., secretary.

Southeastern Veterinary Medical Association, the fourth Wednesday of every month, September through May. Gilbert Meyer, 14003 E. Seven Mile Rd., Detroit 5, Mich., secretary.

MISSOURI—Greater St. Louis Veterinary Medical Association, the first Friday of the month (except July and August) at the Sheraton Hotel, Spring Ave. and Lindell Blvd. Allen B. Shopmaker, 136 N. Meramec, Clayton 5, Mo., secretary.

Kansas City Small Animal Hospital Association, the first Monday of each month, at alternating hospitals. W. F. Noland, 7504 Mercalf, Overland Park, Kan., secretary.

Kansas City Veterinary Medical Association, the third Tuesday of each month at Exchange Hall, ninth floor, Livestock Exchange Bldg., 1600 Genessee St., Kansas City, Mo. Busch Meredith, 800 Woodwether Rd., Kansas City 5, Mo., secretary.

NEW JERSEY—Central New Jersey Veterinary Medical Association, the second Thursday of November, January, March, and May at Old Hights Inn, Hightstown, N. J. David C. Tudor, Cranbury, N. J., secretary.

Metropolitan New Jersey Veterinary Medical Association, the third Wednesday evening of each month from October through April at the Academy of Medicine, 91 Lincoln Park South, Newark, N. J. Myron S. Arlein, 2172 Milburn Ave., Maplewood, N. J., secretary.

Northern New Jersey Veterinary Association, the fourth Tuesday of each month at the Casa Mana in Teaneck. James R. Tanzola, Upper Saddle River, secretary.

NEW YORK—New York City, Inc., Veterinary Medical Association of, the first Wednesday of each month at the New York Academy of Sciences, 2 East 63rd St., New York City. C. E. DeCamp, 43 West 61st St., New York 23, N. Y., secretary.

Monroe County Veterinary Medical Association, the first Thursday of even-numbered months except August. Irwin Bircher, 50 University Ave., Rochester, N. Y., secretary.

NORTH CAROLINA—Central Carolina Veterinary Medical Association, the second Wednesday of each month at 7:00 p.m. in the O'Henry Hotel in Greensboro. J. W. Peace, High Point, secretary.

Eastern North Carolina Veterinary Medical Association, the first Friday of each month. Wm. Allen Potts, 401 W. James St., Mount Olive, secretary.

Piedmont Veterinary Medical Association, the last Friday of each month at 7:00 p.m. in Mull's Motel in Hickory. N. Car. W. W. Dickson, Box 1071, Gastonia, N. Car., secretary.

OHIO—Cuyahoga County Veterinary Medical Association, the first Wednesday of each month, September through May (except January), at 9:00 p.m. at the Carter Hotel, Cleveland, Ohio. Ed. R. Jacobs, 5522 Pearl Rd., Cleveland, Ohio, secretary.

OKLAHOMA—Oklahoma County Veterinary Medical Association, the second Wednesday of every month except July and August. James M. Brown, 2818 W. Britton Rd., Oklahoma City, secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month in Directors' Parlor of the Brookside State Bank, Tulsa, Okla. Merle S. Watts, 5302 E. 11th St., Tulsa, Okla., secretary.

PENNSYLVANIA—Keystone Veterinary Medical Association, the fourth Wednesday of each month at the University of Pennsylvania School of Veterinary Medicine, 39th and Woodland Ave., Philadelphia 4, Pa. Raymond C. Snyder, 39th and Woodland Ave., Philadelphia 4, Pa., secretary.

SOUTH CAROLINA—Piedmont Veterinary Medical Association, the third Wednesday of each month at the Fair-

(Continued on p. 35)



small animal therapy note

Canine Wart Vaccine: a practice builder

Your clients will be highly pleased with the dramatic results obtainable with Jen-Sal's Canine Wart Vaccine. This product is prepared from canine oral papillomas and in tests has proved 100% effective following two subcutaneous 2 cc. injections. The suggested dosage is 2 cc. subcutaneously, or 0.5 cc. intradermally, at 10 to 14 day intervals. Another contribution to small animal medicine from Jen-Sal research.

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GRAIN BELT SUPPLY COMPANY, 4902 S. 33rd St., OMAHA, NEBR.

(COMING MEETINGS—continued from p. 34)

forest Hotel, Union, S. Car. Worth Lanier, York, S. Car., secretary.

TEXAS—Coastal Bend Veterinary Association, the second Wednesday of each month. J. Marvin Prewitt, 4141 Lexington Blvd., Corpus Christi, Texas, secretary.

VIRGINIA—Central Virginia Veterinarians' Association, the third Thursday of each month at the William Byrd Hotel in Richmond at 8:00 p.m. M. R. Levy, 312 W. Cary St., Richmond 20, Va., secretary.

WASHINGTON—Seattle Veterinary Medical Association, the third Tuesday of each month in the Trinity Episcopal Church, 8th and James St., Seattle, Wash. P. R. Des Rosiers, 5508 2nd Ave., N. W., Seattle 7, Wash., secretary.

South Puget Sound Veterinary Association, the second Thursday of each month except July and August. Jo Walker, Agriculture Experiment Station, Puyallup, Wash., secretary.

WEST VIRGINIA—Kyowva (Ky., Ohio, W. Va.) Veterinary Medical Association, the second Thursday of each month in the Hotel Prichard, Huntington, W. Va., at 8:30 p.m. Harry J. Fallon, 200 5th St., W., Huntington, W. Va., secretary.

WISCONSIN—Milwaukee Veterinary Medical Association, the third Tuesday of each month, at the Half-Way House, Blue Mound Rd. George F. Lynch, 201 West Devon St., Milwaukee 17, Wis., secretary.

Hybrid Corn Statistics.—The percentage of all hybrid corn raised in the United States increased from 64.7 in 1954 to 89.2 in 1955. During the decade the percentage in southern states more than tripled.—*Progressive Farmer*, March, 1956.



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Remittance must accompany ad.

Deadlines for Want Ads

For JOURNAL dated 1st of month — 8th of month preceding date of issue.

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Names of classified advertisers using key letters can not be supplied. Address your reply to the key letters. c/o JOURNAL of the AVMA, 600 S. Michigan Ave., Chicago 5, Ill., and it will be transmitted to the advertiser.

Wanted—Veterinarians

Full-time assistant wanted in mixed practice 15 miles from Syracuse, N.Y. New small animal hospital and dairy practice. Salary plus bonus determined by experience. Give reference, training, experience, age, marital status. Recent graduate desired; New York license. Address "Box H 3," c/o JOURNAL of the AVMA.

Student wanted for summer position small animal hospital New York City. Ample opportunity for practical experience. Regular hours; salary; live out. Address "Box H 4," c/o JOURNAL of the AVMA.

Small animal hospital western New York desires graduate veterinary assistant. State qualifications, personal data, salary expected. Address "Box H 8," c/o JOURNAL of the AVMA.

Assistant veterinarian wanted for small animal hospital in Chicago to start in May or June. Write stating any experience, salary expected, and personal data. Address "Box H 10," c/o JOURNAL of the AVMA.

Veterinarian wanted for general practice in New England. House can be furnished at small animal hospital. State qualifications and salary expected in first letter. Address "Box G 9," c/o JOURNAL of the AVMA.

Veterinarians wanted for state meat inspection, experienced. Starting salary, \$5,160 with increments to \$5,880; social security coverage; state retirement; vacation and sick leave benefits. Write to Personnel Director, State Health Department, Richmond 19, Va.

Leading Midwest ethical biological and pharmaceutical laboratory in veterinary field has excellent opportunity with good future available for young veterinarian interested in professional writing, public and professional relations, and field evaluations of new products. Practice experience desirable. Write, defining interest and stating any experience or training in above fields. Address "Box F 1," c/o JOURNAL of the AVMA.

(Continued on p. 42)



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HOG CHOLERA
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Full modified virus, vacuum dried,
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confers quick, positive immunity.



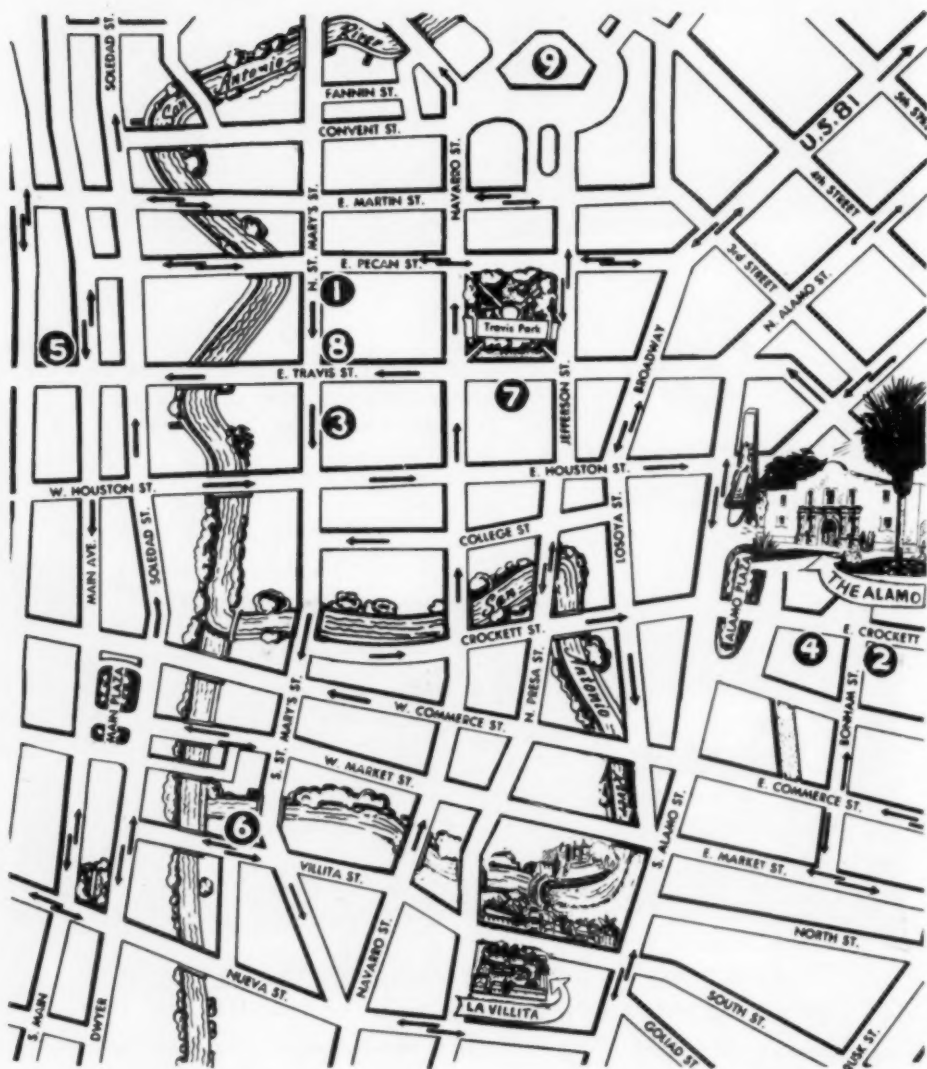
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Hotel Map of San Antonio



- | | | |
|----------------------|------------------------|----------------------|
| 1. Blue Bonnet Hotel | 4. Menger Hotel | 7. St. Anthony Hotel |
| 2. Crockett Hotel | 5. Robert E. Lee Hotel | 8. White Plaza Hotel |
| 3. Gunter Hotel | 6. Plaza Hotel | 9. Auditorium |

Motel Information—Motels listed on the reservation form are located on Austin Highway, U.S. 81, which enters San Antonio via Broadway. Rio Lado Motel is at 1100 N. St. Mary's St., near the business section.

HOTEL RESERVATIONS — SAN ANTONIO CONVENTION

Ninety-Third Annual AVMA Meeting, Oct. 15-18, 1956

All requests for hotel accommodations will be handled by a Housing Bureau in cooperation with the Committee on Local Arrangements. The Bureau will clear all requests and confirm reservations.

Hotels—Motels and Rates (all are air-conditioned)

HOTEL	SINGLE	DOUBLE	TWIN BEDS
1. Blue Bonnet	\$3.00-5.00	\$5.00-8.00	\$
2. Crockett	\$3.50-4.50	\$5.50-6.50	.....
3. Gunter	\$5.00 and up	\$6.50 and up	.....
4. Menger	\$5.00-8.00	\$7.00-12.00	.....
5. Robert E. Lee	\$3.50-5.00	\$5.00-6.00	\$6.00-8.00
6. St. Anthony	\$5.00 and up	\$7.00 and up	.....
7. White Plaza	\$3.25 and up	\$4.75 and up	.....

MOTEL	RATES
1. Aero	\$7.50-9.00
2. Aloha	\$6.00 and up
3. Belvedere	\$6.00-10.00
4. Casa Linda	\$6.00 and up
5. Coronado	\$5.00 and up
6. Park	\$4.00-15.00
7. Rio Lado	\$6.00-10.00
8. The Westerner	\$5.00 and up
9. Flamingo	\$6.00 and up

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RESERVATION FORM — AVMA CONVENTION — SAN ANTONIO

To: HOUSING BUREAU, San Antonio Visitors and Information Department, Chamber of Commerce, Insurance Building, San Antonio 5, Texas.

Please make reservations indicated below:

HOTEL

_____ Single room(s) at \$

_____ Double bed room(s) at \$

_____ Twin-bed room(s) at \$

_____ Suite (specify type of accommodations wanted)

(Three choices MUST be shown)

First choice hotel

Second choice hotel

Third choice hotel

Arriving on (date) at a.m. p.m.

Leaving on (date) at a.m. p.m.

Will be occupied by (attach list of additional names if necessary).

Your Name (Print or Type)

Street Address City and State or Province

MOTEL

Indicate type of accommodations

(.....)
Unit, Cabin,

wanted for persons at \$
No. rate

(Three choices MUST be shown)

First choice motel

Second choice motel

Third choice motel

Correspondence

February 21, 1956

Dear Dr. Aitken:

You might like to use the following item as a news "squib" in the AVMA JOURNAL:

What is believed to be one of the earliest, if not the first, closed-circuit television demonstration to a class in veterinary anatomy was conducted Friday, Feb. 10, 1956, in the Giltner Hall auditorium at Michigan State University. Dr. Wade Brinker of the Department of Surgery and Medicine removed the forelimb of a cat. He was assisted by Dr. C. W. Titkemeyer of the Anatomy Department who narrated the procedure, pointing out the muscles, nerves, and blood supply as the operation progressed.

While the operators were in plain sight to the whole class, two television screens were available for a close-up view of the operation at all times. The demonstration was attended by about 200, and exceedingly well received.

This is a milestone in the practical application of anatomy, and it is hoped more and more of such type of teaching can be carried out in the future.

Thank you for your consideration.

Sincerely,
s/Lois Calhoun,
Michigan State University,
East Lansing.

• • •

February 16, 1956

To the Editor:

There have been two articles published in the J.A.V.M.A. referring to the use of *Rauwolfia serpentina* tablets each containing 0.25 mg. of the drug. The first paper appeared in the June, 1955, issue entitled "Accidental *Rauwolfia Serpentina* Poisoning in a Dog" by I. Howard Kahn of Glenside, Pa. The second article appeared in the recent February 1st issue entitled "Some Clinical Uses for *Rauwolfia Serpentina*" by H. M. Tabbut of Wellesley Mills, Mass.

The reader would infer from these articles that the authors were referring to the content of *Ran-*

wolfia serpentina, whereas it is evident that they are referring to content of reserpine which is the principle active alkaloid extracted from the root of the plant *Rauwolfia serpentina* and other species. Since crude root preparations are available for human use, I bring this to your attention in order to avoid confusion in this respect. The content of the extremely potent reserpine alkaloid is very low in the root, necessitating doses estimated to be at least 500 to 1,000^{1,2} times that of reserpine in order to obtain comparable effects with the crude root.

Sincerely yours,
s/Alfred E. Earl, D.V.M.,
Director of Veterinary Research,
Ciba Pharmaceutical Products.

¹Wilkins, R. W., Judson, W. E., Stone, R. W., Hollander, W., Huckabee, W. E., and Friedman, I. H.: New England J. Med., 250, (1954): 477.

²Tuchman, H., and Crumpton, C. D.: Am. Heart J., 49, (May, 1955): 742.

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**BE SURE IT'S STAMPED
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Lowers the cost of combined penicillin-streptomycin therapy.

Enhances effectiveness of each antibiotic.

Gives a broader antimicrobial range of activity.

Provides rapid antibacterial action.

Provides effectiveness against some organisms which may be resistant to individual antibiotics.

Produces high blood and tissue concentrations, promptly attained.

Results in minimum development of resistant strains.

Is exceptionally well tolerated in all species of animals.

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Single-dose vials

Five-dose vials

each dose contains: 100,000 units penicillin G potassium, 300,000 units penicillin G procaine and 1.0 gram dihydrostreptomycin.

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Single-dose vials (2 cc.)

Five-dose vials (10 cc.)

Fifty-dose vials (100 cc.)

each dose contains: 400,000 units penicillin G procaine and 0.5 gram dihydrostreptomycin.



Department of Veterinary Medicine

PFIZER LABORATORIES, Division, Chas. Pfizer & Co., Inc., Brooklyn 6, N. Y.

Assistant veterinarian wanted in poultry pathology diagnostic laboratory. Address Dr. O. Schwabe, Vineland, N.J.

Opportunity and future for qualified veterinarian in modern small animal hospital in Mid-Atlantic state. Give full particulars in reply. Address "Box H 11," c/o JOURNAL of the AVMA.

Assistant veterinarian wanted in Cleveland small animal hospital. State references and particulars in first letter; Ohio license necessary. Address "Box H 13," c/o JOURNAL of the AVMA.

Woman veterinarian wanted in small animal practice to take charge of pathology and laboratory; apartment available. Experience preferable but not necessary; will consider recent graduate. Address "Box H 14," c/o JOURNAL of the AVMA.

Veterinarian wanted for mixed practice in Pennsylvania; salary, \$4,800 to start. Car furnished or will pay mileage. Address "Box H 16," c/o JOURNAL of the AVMA.

Wanted—Positions

Reliable veterinarian with experience in small animal practice seeks position in small animal hospital. Excellent references; married; available July 1. Address "Box G 10," c/o JOURNAL of the AVMA.

Veterinarian with 5 years of excellent experience

desires position with future in mixed practice. Would consider buying on lease, purchase, or other similar plan. Prefer southern or southwestern location. Address "Box H 6," c/o JOURNAL of the AVMA.

Wanted—Practices

Wanted in New York State, purchase or partnership in small animal hospital. Consider association with veterinarian planning to retire. Have substantial down payment. Address "Box H 5," c/o JOURNAL of the AVMA.

Cornell graduate, 1945, wants to buy general practice; 70% small animals. Practiced 8 years plus 3 in military; anxious to get re-established. Send details to Stanton E. Bower, Angola, N. Y.

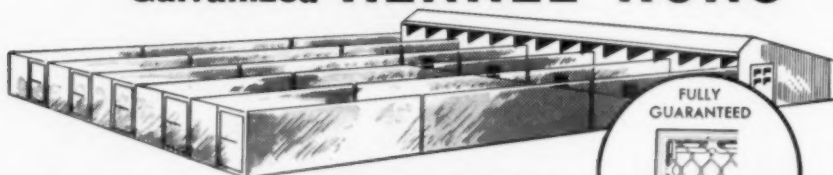
Small animal practice wanted in western New York; must be a going, established practice completely equipped. Substantial down payment. Address "Box E 7," c/o JOURNAL of the AVMA.

Capable veterinarian, 5 years' experience in mixed dairy practice, wishes to purchase similar practice on West Coast. Will consider either single or partnership practice; able to buy; excellent references. Address "Box H 17," c/o JOURNAL of the AVMA.

Want to buy, or lease with option to buy, New Jersey small animal practice. Address "Box H 12," c/o JOURNAL of the AVMA.

(Continued on p. 43)

Trouble-Free Galvanized KENNEL RUNS



Featuring FORD'S Exclusive DOUBLE FRAME CONSTRUCTION

Nothing can match Ford Kennels for safety and long service. No tie wires to rust out, no dangerous sharp ends with Ford's exclusive patented double frame construction. Rust-resistant, galvanized chain link fabric is permanently locked to welded inner frame. In a versatile array of panels to meet every need—at easy-to-afford prices.

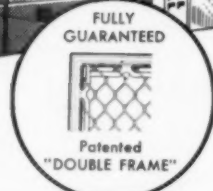


5 COMPARTMENT STALLS

Waterproof. Heavily galvanized sheets. 1½" angle iron frames braced and welded 1" pipe door frames with dog-proof mesh. Completely assembled. 2' and 3' interior stacking stalls also available. Satisfaction guaranteed.

109-D West 21st St., Indianapolis, Indiana

Write for the name of your nearest dealer.



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in burlap bags

50 lb.—\$4

100 lb.—\$7

F.O.B. Indianapolis. No C.O.D.'s.

Ford

KENNEL EQUIPMENT

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Well-established practice for sale in Maryland; 75% dairy, with small animal increasing rapidly. High-type clientele, excellent working conditions. Grossed over \$22,000 last year. Practice, residence, and drugs \$30,000. Real estate value alone \$22,500. Practice available June 1; will assist during June; \$15,000 will handle. Address "Box H 1," c/o JOURNAL of the AVMA.

Large and small animal location for sale in central Ohio; 75% large animals. Price of real estate only; includes modern hospital and home. Excellent one-man practice now. Reason for selling, ill health. Address "Box H 2," c/o JOURNAL of the AVMA.

Mixed practice for sale in Indiana; 85% large animals. Six-room home, 4-room office combination; \$5,000 down will handle. Address "Box H 7," c/o JOURNAL of the AVMA.

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(Continued on p. 47)

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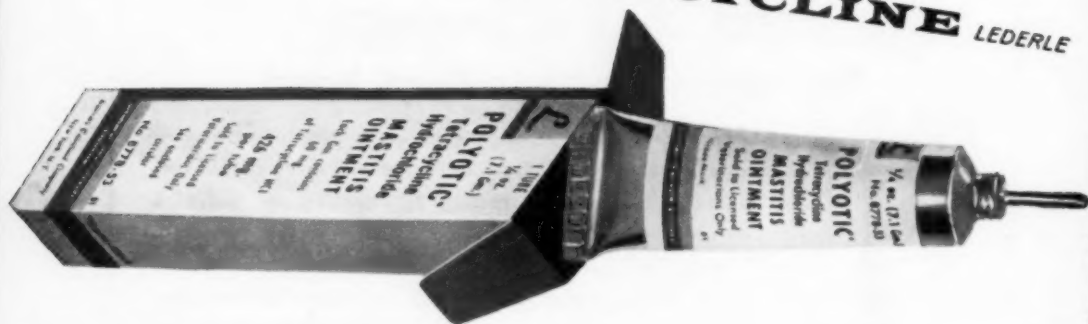
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